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Descriptors-*Academic Achievement, Educational Experiments, *Effective Teaching, *Feedback, Grade 6, Inservice Teacher Education, Interaction Process Analysis, Statistical Analysis, *Student Attitudes, *Student Reaction, Teacher Attitudes, Teacher Behavior

Identifiers-Flanders' System of Interaction Analysis, Hayes Pupil Teacher Reaction Scale, Minnesota Teacher Attitude Inventory, MTAI, Scale to Measure Attitude Toward Any Sch, Stanford Achievement Test

This study continues an earlier project (ED010369) to determine if student achievement and attitude toward school subjects (1) can be improved by increasing feedback to teachers concerning pupil and/or trained observer reaction to their teaching, (2) correlate significantly with attitude of teachers toward their pupils, (3) can be improved to a greater degree by face-to-face feedback to teachers than by standardized feedback via mail. A pre- and posttest 2 by 4 factorial design was used with the sample of 80 teachers and 1,912 sixth grade students in 7 Pennsylvania school districts. Statistical analysis of the data using class means revealed no significant differences in achievement or attitude, but analysis using individual scores indicated significant differences favoring written feedback, particularly that of pupil reactions to teaching. Teacher opinionnaires indicated that benefits derived from both pupil ratings and classroom interaction analysis warranted their wide use in teacher inservice programs. Overall implications are that it is necessary to provide frequent and intensive help to teachers in order to change teacher behavior or effectiveness. Included are a 48-item bibliography; a 17-page manual, "Interaction Analysis: A Program for Interpretation of Matrices;" the Hayes Pupil-Teacher Reaction Scale; the teacher's Feedback Study Opinionnaire; and 48 tables of statistical data and analysis. (JS)

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-24

THE EFFECTS OF STUDENT REACTIONS TO TEACHING METHODS

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Bureau of Research

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THE EFFECTS OF STUDENT REACTIONS TO TEACHING METHODS

Cooperative Research Project No. 6-2056

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS iii

INTRODUCTION 1

METHOD 4

RESULTS 13

DISCUSSION 25

CONCLUSIONS 26

IMPLICATIONS 26

SUMMARY 27

REFERENCES 29

APPENDIXES

A. Interaction Analysis: A Program for Interpretation of Matrices
B. Hayes Pupil-Teacher Reaction Scale
C. Rationale for Pupil Teacher Rating
D. Teacher Reactions
E. Statistical Data and Analysis

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Lafayette Elementary School
Lincoln Elementary School
Madison Elementary School
Marvine Elementary School
Miller Heights Elementary School
Penn Elementary School
Rosemont Elementary School
Spring Garden Elementary School
Stevens Elementary School
Washington Elementary School

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Washington Twp. Elementary School

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Porter Elementary School
Vanderveer Elementary School
Wolf Elementary School

East Penn School District

Jefferson Elementary School
Lincoln Elementary School
Wescosville Elementary School

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Lower Saucon Elementary School
Reinhard Elementary School
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INTRODUCTION

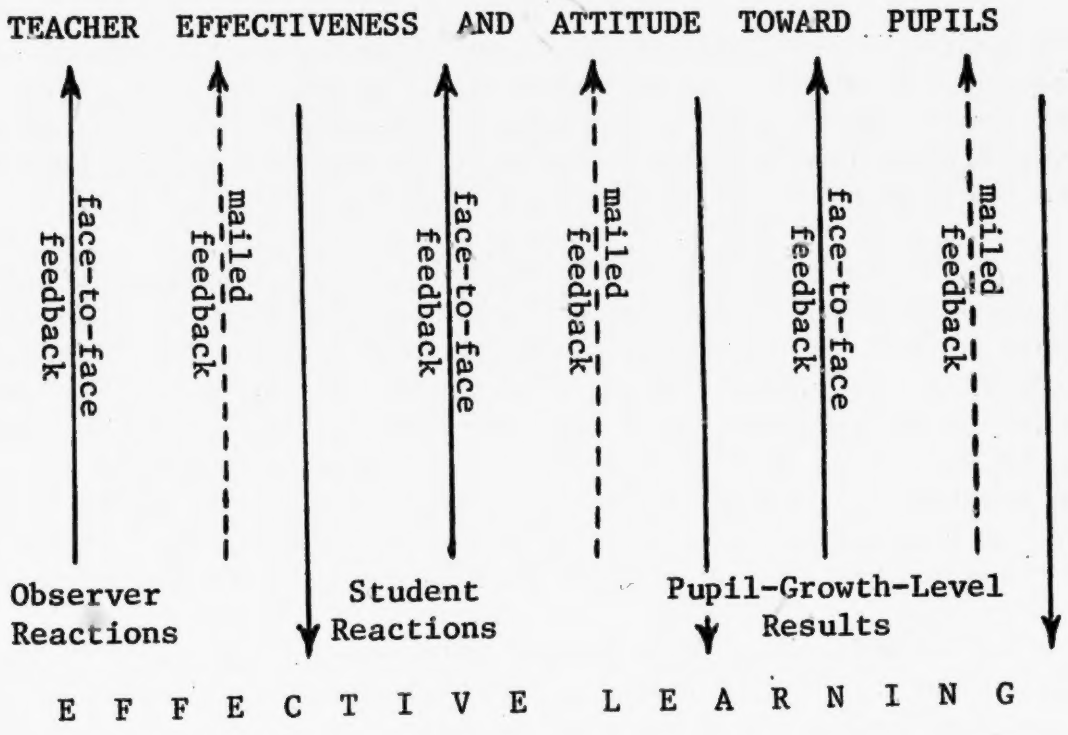
THE PROBLEM

What constitutes quality education? Even more important, how can quality education, how can teaching, and how can learning be improved? Quality education is defined here as teaching which results in optimum student achievement and student attitude toward subject.

The major assumptions of this study were:

1. Teaching and learning require effective interaction between teacher and students.
2. Quality education greatly depends on teacher performance in the classroom.
3. Teacher effectiveness may be improved through organized feedback to teachers of observer ratings of the teaching process.

The above assumptions were the bases for the major hypothesis of this study. This hypothesis was that by increasing and systematizing feedback to teachers, the teaching process will be improved with the result that student learning will increase. Accordingly, the following paradigm was tested:


TEACHER EFFECTIVENESS AND ATTITUDE TOWARD PUPILS
face-to-face feedback
mailed feedback
face-to-face feedback
mailed feedback
face-to-face feedback
mailed feedback
Observer Reactions
Student Reactions
Pupil-Growth-Level Results
EFFECTIVE LEARNING

This study was the second year (47) of an attempt to determine which of three types of feedback to teachers might result in a significant difference in student achievement and attitude toward courses of study.

OBJECTIVES

The general objectives were to determine if student achievement and student attitude toward school subjects:

1. Can be improved significantly by systematically increasing feedback to teachers concerning pupil reaction to their teaching.

2. Can be improved significantly by systematically increasing feedback to teachers concerning reaction of trained observers to their teaching.

3. Correlate significantly with attitude of teachers toward their pupils.

4. Can be improved to a greater degree by face-to-face feedback to teachers than by standardized feedback via mail.

RELATED RESEARCH

Kinhart (48) found that pupils of teachers who received ten hours of supervision did significantly better school work than pupils whose teachers were without supervision. Ten hours per month per teacher is costly. A need exists to determine if significant improvement in student growth can be achieved with the minimum hours of teacher supervision.

Costs of improving the quality of education could be reduced even further if significant improvement in student growth could be effected through pupil teacher rating and feedback of results to teachers. Gage, Chatterjee and Runkel (45) found that sixth-grade teachers will modify their teaching in the light of pupil rating if feedback of these ratings is given to the teachers. If feedback of pupil reaction to the teaching of their teachers has as beneficial a result as feedback of observer ratings, then a considerable savings could be made in both time and money.

While a second rating after an appropriate interval subsequent to feedback may reflect change in the teaching process, a primary criterion should be end-product student measurement versus pre-measurement. As Bloom (3) insists, "The research worker who wishes to understand teaching and teachers must understand not only the teaching and education process as it takes place, but also the outcomes or effects of the process - the changes that take place in the learners..."

The investigator also felt the need to attempt to measure the attitude of teachers toward their pupils. Does rating feedback affect the way teachers feel toward pupils? Ryans (17) found teachers, judged by their principals to be superior in teaching performance, held significantly and distinctly more favorable attitudes toward their pupils than did teachers judged by their principals to be unsatisfactory or poor. Do classes which make the greatest gain have teachers whose attitude toward them as pupils is most favorable? The answers to these questions are needed to clarify the answer to the question of how to improve the quality of education.

The proposed study was in keeping with the recommendation of Ryans that studies be made "...of the influence of different in-service experiences of teachers..." (17) It was an attempt to silence criticism that educational research rarely seeks to improve the structure of what goes on in the classroom. (13) This study followed the advice of those who say: "...it is with respect to the teaching process itself that the greatest potentiality for research lies..." (36) It was a study aimed at "doing something to change conditions rather than merely measuring and correlating them." (28)

METHOD

GENERAL DESIGN

Teacher evaluation and feedback to teachers were used in an attempt to improve the teaching process in order to improve pupil growth (see paradigm on page one). The independent variables were the various types of feedback to teachers. The dependent criterion variables were: (1) end-of-year ratings and observations of teachers, (2) end-of-year teacher attitudes toward pupils, (3) end-of-year pupil achievement on standardized tests, and (4) end-of-year pupil attitude toward school subjects.

"Feedback models have rarely been used in educational research." (25) Yet Flanders and others have found that it is possible to systematically record teacher-pupil classroom interaction and thereby "assess the degree to which a teacher is meeting the social-emotional, as well as the intellectual needs of the pupils." (4)

Design 4 (Pre-test - Post-test Control Group Design) as outlined by Campbell and Stanley (11) was adapted to this study. This design makes provision for sources of internal invalidity such as history, maturation, testing, instrumentation, regression, selection, mortality, and interaction of selection and maturation factors. The weaknesses of this design in controlling sources of external invalidity were counteracted to some extent by the way the sample was drawn and the manner in which the data was analyzed. The design of this study may be diagrammed as follows:

R	O_1	X_1	O_2
R	O_3	X_2	O_4
R	O_5	X_3	O_6
R	O_7	X_4	O_8

In the above, R indicates random assignment to treatments. O_1, O_3, O_5, and O_7 indicate pre-tests for achievement and attitude. X_1, X_2, X_3, and X_4 represent the treatment conditions while O_2, O_4, O_6, and O_8 were the post-tests for achievement and attitude.

POPULATION AND SAMPLE

The typical Pennsylvania elementary school is fairly typical of the typical American public elementary school.

In 1962-63, the average American school system spent $536 per pupil in average daily attendance, while the average school system in Pennsylvania spent $529 per pupil in average daily attendance. The average salary of the elementary teacher is $5,560 in the United States, while the same average in Pennsylvania is $5,610. In America the average school building is about 24 years old, while in Pennsylvania this average is about 30 years old. The average per capita personal income in 1962 for the United States was $2,357, while $2,368 was the case for Pennsylvania. (42) In many respects the typical Pennsylvania elementary school represents the typical American elementary school.

The 851 elementary school systems of Pennsylvania were asked if they wished to participate in an experiment to improve teaching and learning. These schools were sent a summary of the proposed study. The schools which gave favorable replies were spread over a wide range of size and per-pupil expenditure. From this group of volunteering schools, a stratified random sample was selected of school systems involving 48 school buildings. Stratification was by per-pupil expenditure to obtain a truly representative sample of the total population.

Stratification of the sample by per-pupil expenditure hopefully accounted for other factors known to correlate with achievement and aptitude. Project Talent (43), which involved 440,000 high school students, representative of the entire country, found that per pupil expenditure correlated .537 with family income, .535 with starting salaries of male teachers, .559 with starting salaries of female teachers, .307 with years of schooling completed by parents and from .258 to .454 for seventeen achievement and aptitude areas. Also, it is noted that in the New York State Quality Measurement Project (27), involving over 70,000 pupils, the good schools (based on student achievement) spent 25 percent more per pupil for instructional purposes than did the poor schools.

To help limit the threat to external invalidity known as reactive arrangement, this study randomly selected entire classrooms as normally scheduled units rather than randomly assigning students to treatments. The sampling representativeness was increased by reducing "...the number of students or classrooms participating from a given school...and (increasing) the number of schools in which the experiment was carried on." (11) Classrooms were also stratified by school subjects so that within each treatment an equal number of the following school subjects were represented: English, mathematics, social studies, reading and science.

This study was limited to the sixth grade in order to simplify the problems of testing, control, and coordination. The pupils spread widely over the range of IQ and achievement except no special education classes for children of limited ability or unusual handicaps were included. Eighty teachers were selected for participation. These teachers were assigned randomly to one of four treatments so that 20 teachers and their classes were in each treatment. There were also eight additional teachers and classes involved to guard against teacher losses due to sickness, death, pregnancy, etc. These eight additional teachers did not know they were alternates since they were involved in the same ways as were the other teachers.

There were about 600 pupils per treatment or a total of approximately 2400 pupils in the entire study. Schools were selected from adjacent counties for efficiency of supervision and coordination.

TREATMENT 1

Treatment 1 involved pupil-teacher rating. Teachers need to see themselves as their students see them. The crucial test of teaching is how it changes the students who are being taught. Students are the only group who see their teachers day after day in the classroom. Students are not experts on the teaching process, but they can furnish valuable evidence which should be used to improve teaching. Objective teachers want to know how they can get along more successfully with their students.

There is evidence that students are honest, reliable raters of teachers and that students can furnish valuable evidence even though they are not experts on teaching. Bryan (5) cites studies of student ratings with reliability coefficients ranging from .64 to .99 with an increase in reliability as the studies move from the college level to the intermediate elementary level.

Leeds (33) found that 100 teacher-pupil inventory scores correlate as follows:

.43 with ratings by their principals
.49 with ratings by Leeds
.45 with ratings by their students.

Evidence of validity of pupil ratings is that such ratings have correlated as follows with principals' ratings for the same teachers:

.60 with discipline ratings
.70 with teacher-pupil relations
.40 with ability to encourage learning. (40)

Starrak discovered that the opinions of students and of three faculty experts agreed seventy-five percent of the time. (38) Druckers and Remmers found that alumni rate their former teachers similarly to when as students they had rated the same teachers. (26).

At Brooklyn College no appreciable differences in instructors' scores were found to exist because of course grades received by students (6,681), size of classes, sex of students, college year, or whether or not the course was elective. (29) Remmers (37) and Hudelson (32) report low correlation coefficients (.07 and .19 respectively) between student ratings of college instructors and student grades received from their instructors. It appears that students, if approached properly, are honest, reliable raters of their teachers.

Remmers also says: "If 25 or more student ratings are averaged, they are as reliable as the better educational and mental tests at present available." (15) In this experiment the teachers were given their average ratings by item and for total since a few students can be expected to be much too far to one extreme or another.

Gage, Runkel, and Chatterjee found that when sixth-grade teachers were furnished information on how their pupils described their actual teacher and how they described their ideal teacher, teachers' behaviors changed in the direction of their pupils' conception of an ideal teacher by the second time the pupils rated their actual teacher a month or two later. The feedback not only changed teacher behavior, but the teachers were able to more accurately predict their pupils' description of their teaching.

Gage (45) and his associates found statistically significant differences for post-results between the experimental and control groups of teachers at the .05 level for only four of the 12 items on the pupil-teacher rating instrument. Also, the teachers who approached most closely to their pupils' ideal teacher were in the group with the longest, or about 53 days, between feedback and post-ratings of teachers.

In Treatment 1 students rated their teachers every three weeks between September 26 and December 22, 1966. Feedback to teachers included class frequencies and averages for each item on the pupil-teacher reaction scale without any indication of how individual students rated them. In March and April the students again rated their teachers to see if teachers had improved in the eyes of their students. An interval of two and one-half months existed between fall feedback and spring rating of teachers.

TREATMENT 2

Treatment 2 involved a systematic recording (by two carefully trained observers) of classroom teacher-pupil interaction four times in the fall (between September 26 and December 22, 1966) and twice in the spring (between March 6 and April 25, 1967). An interval of two and one-half months existed between the fall feedback and spring observation of teachers.

Research on improvement of teaching requires observation of teachers while they teach. Medley and Mitzell note: "Certainly there is no more obvious approach to research on teaching than direct observation of the behavior of teachers while they teach and pupils while they learn. Yet it is a rare study indeed that includes any formal observation at all." (14)

Ryans offers this pertinent advice:

> Of the measurement approaches employing observation and assessment of teacher behavior in process only time sampling involving replicated systematic observation by trained observers produces sufficiently reliable data to recommend its use in fundamental research... (16)

Medley and Mitzell point out that validity of measurement of behavior depends on: (1) a representative sample; (2) accurate recording; and (3) scoring which faithfully reflects differences in behavior. (14)

The two observers used in this study were trained in interaction analysis in the first week of September 1965 at Temple University and they had performed interaction analysis some 1680 times during the previous year in a similar study on the secondary level. A high degree of reliability (.90) was obtained between these two observers. The observers were randomly assigned to observe teachers. Each observer observed one-half of the teachers in each treatment and observed the same randomly selected teachers throughout the study.

TREATMENT 3

In this treatment teachers received feedback of both student ratings (as in treatment 1) and observations based on classroom interaction analysis (as in treatment 2). Both of these kinds of feedback were based on two occasions in the fall semester (September and October) and once in the spring semester (March) with a 20-week interval between last fall feedback and the first spring observation.

TREATMENT 4

In this treatment the teachers received only the pre-test results for pupil achievement and attitude toward subjects (English, arithmetic, science, reading and social studies).

ADDITIONAL TREATMENT PROCEDURES

In treatments 1, 2, and 3 all teachers received the same pre-test results as did the teachers in treatment 4. In treatments 1 and 4 teachers were observed without feedback twice in the fall and once in the spring. In treatments 2 and 4 students rated their teachers twice in the fall and once in the spring without feedback to the teachers.

One-half of the teachers in each treatment were selected randomly for face-to-face feedback while the other half received standardized mailed feedback only. This resulted in a 2 by 4 factorial design with 10 teachers and their classes per cell as indicated below:

NUMBER OF TEACHERS BY TYPE OF FEEDBACK AND TREATMENT

	TREATMENT				
Type of Feedback	X_1	X_2	X_3	X_4	Totals
Face-to-Face	10	10	10	10	40
Via Mail	10	10	10	10	40
Totals	20	20	20	20	80

IN-SERVICE EDUCATION

During the second and third weeks of July 1965, the co-investigators visited with each involved chief school administrator to explain the study and to obtain their cooperation. All involved teachers and administrators in all treatments and controls received two days of orientation on the 17th and 24th of September to explain the purpose and importance of the study. A climate of understanding and acceptance was the goal. Teachers also completed the Minnesota Teacher Attitude Inventory and worked a programmed learning approach to Flanders classroom interaction analysis (Appendix A). Dr. Edmund J. Amidon and Dr. Anita Simon of Temple University explained how teachers could use results of the Flanders system. On April 15, 1967 teachers and administrators also participated in a spring "round-up". After teachers completed the Minnesota Teacher Attitude Inventory and an attitude questionnaire concerning the study, they were briefed on results to date, their questions were answered by the investigators, and the final testing procedures were explained.

TEACHER RATING BY OBSERVERS

Medley and Mitzell's (14) review of research led them to conclude that teacher observation should be separated from quantified rating. Since Anderson's (22) pioneer work, others such as Bales, (2) Bush, (10) Thelen, (19) Withall, (41) Lewis, (34) Flanders, (44) and Amidon (21) have investigated student-teacher interaction as a determiner of effective teaching.

In this study the Flanders system of teacher-pupil interaction analysis was used. Flanders and his associates use just ten categories (see Appendix A) for recording teacher-pupil-verbal-response behavior in the classroom. Every three seconds the observer writes down the category number of the interaction he has just observed. These numbers are recorded in sequence in a column and after the class are easily quantified into a matrix which provides insight into the teaching process. "With the use of this recording procedure it is possible to assess the degree to which a teacher is meeting the social-emotional, as well as the intellectual, needs of the pupils." (4)

The validity of the Flanders technique is self-evident since it permits the recording of immediately perceived behaviors. The reliability of the procedure was assured through the use of observers thoroughly trained and experienced with interaction analysis. Satisfactory coefficients of observer reliability were obtained before the actual experiment commenced.

The Flanders instrument has been successfully field tested with 900 students, half in seventh-grade social studies and half in eighth-grade geometry. It was found that "...in both content areas the students of the more indirect teachers scored higher on achievement tests than did students of the more direct teachers." (1) It also found that the more flexible teachers who could shift readily from direct to indirect and vice versa approaches had more success improving student achievement than did teachers with less flexibility in their classroom behavior.

PUPIL RATING OF TEACHERS

A great number of pupil-teacher rating instruments have been devised and are of value but a more satisfactory instrument is needed. Barr has examined many investigations of teaching efficiency of the past several decades and he has found them paying insufficient attention to "...The particulars of teaching..." (23) and the relationship between teacher and student. (24) Those devising teacher-rating instruments seem to have ignored the unidimensional scalogram technique. Yet McNemar conceded as early as 1946 that a scale devised by this technique has "...superiority on the single dimension problem..." (35)

A unidimensional scale places each item along a single continuum similar to the inches of a yardstick. Each total score tells which items were reacted to favorably and which were reacted to unfavorably. Intensity analysis can be used to determine which score represents a dividing line between favorable and unfavorable attitudes. A satisfactory unidimensional scale is derived from the universe of attributes which define the concept and have a common content.

Since there is evidence that the Hayes Pupil-Teacher Reaction Scale (Appendix B) may be unidimensional, it was used in this study. Several administrations and successive refinements in 1960 of the Hayes Scale indicated that there are certain desirable behaviors which are generally characteristic of good teachers and that these behaviors are not generally characteristic of poor teachers. (46)

In 1961 a follow-up study (46) with the Hayes instrument resulted in what appears to be a unidimensional instrument to measure attitude of students toward the teaching effectiveness of their teachers.

TESTING PROGRAM

On September 12, 1966 test coordinators from the 48 elementary schools involved attended an orientation meeting at East Penn Union Junior High School, Emmaus, Pennsylvania, where adherence to standardized test directions and time limitations was stressed. During the third week of school these test coordinators had administered the following: the Remmers Scale to Measure Attitude Toward Any School Subject, and Form X of the 1964 edition of the Stanford Achievement Test, Intermediate II Battery. During the weeks of April 16 and 23, Form Y of the 1964 edition of the Stanford Achievement Test, Intermediate Battery II was administered as a post-test. The Remmers Scale to Measure Attitude Toward Any School Subject was administered during April as another post-measurement.

ANALYSIS OF DATA

Can student achievement be improved significantly by feedback to teachers of:

1. Pupil reaction to their teaching?
2. Reaction to their teaching by trained observers?
3. Results on pre-pupil growth evaluation?

Since intact classes had been assigned randomly to treatments, the class achievement means were used as the basic observations and treatment effects were tested against variations in these means. Data was also analyzed with individual pupil scores as the basic observations to see if statistically significant results would occur. Where necessary, covariance was used in addition to analysis of variance. Additional comparisons were made of achievement results for classes whose teachers are primarily direct (commanding, lecturing, criticizing, justifying) versus classes whose teachers are primarily indirect (accepting, asking, praising, encouraging) in their teaching.

Can student attitude toward school subjects be improved significantly by feedback to teachers of:

1. Pupil reaction to their teaching?
2. Reaction to their teaching by trained observers?
3. Results of pre-experimental pupil evaluation?

Analysis of variance and covariance, if needed, were used to analyze the data.

Does attitude of teachers toward their pupils correlate significantly with student achievement and student attitude toward school subjects? Pearson product moment correlation coefficients were computed between teacher inventory scores and class achievement means and also between teacher inventory scores and attitude toward subjects means.

A Pearson product moment correlation coefficient was computed between each set of pupil ratings of teachers to obtain a test-retest indication of reliability. Unidimensional Cornell scalogram analysis was applied to pupil ratings of teachers. (30) Analysis of variance and covariance was used to compare results. Frequency tables were prepared to help interpret the results of the teacher opinion questionnaire (Appendix D).

TEACHER REACTIONS

To obtain the reactions of teachers to the study, a questionnaire (Appendix C) was administered to all teachers.

RESULTS - PART ONE

TEACHER REACTIONS

Eighty-eight percent of the 60 teachers receiving feedback (based on pupil ratings or classroom observation or both) reported that the feedback provided a critical analysis of their teaching and an objective basis for improvement. Only six of the 40 teachers who received face-to-face feedback (in addition to written feedback) would have preferred written feedback only. Seventy-three percent of the 40 teachers who received written feedback only would have preferred to have been given face-to-face feedback also.

Eighty-one percent of the 80 teachers said they adequately understood the purpose of the study. Forty percent thought too much was covered in the two orientation days, while forty-four percent felt instruction was not sufficient for them to accurately interpret classroom interaction analysis matrices. Yet 90 percent of teachers receiving feedback on classroom interaction analysis indicated they had a meaningful basis for changing their teaching. Also, 90 percent of teachers who received feedback on their pupil ratings felt that most of their pupils accurately rated their teaching. Of the 40 teachers receiving feedback on pupil ratings, 83 percent reported the benefits warranted widespread use of pupil rating of teachers. Also, 86 percent of all 80 teachers agreed that the benefits derived from classroom interaction analysis were such that this should be used widely in teacher in-service training programs. A more detailed description of teacher reactions to the study may be found in Appendix D.

RESULTS - PART TWO

Since intact classes had been assigned randomly, the class means were used as the basic observations for analysis.

ACHIEVEMENT MEANS

Student achievement was measured at the beginning and at the end of this study by Stanford Achievement Test complete battery, using form X for pre-testing and form Y for post-testing. The Stanford Achievement Tests included the following individual tests: Word Meaning, Paragraph Meaning, Spelling, Language, Arithmetic Computation, Arithmetic Concepts, Arithmetic Applications, Social Studies, and Science. Composite scores for Reading were obtained by combining results in Word Meaning and Paragraph Meaning. Composite scores for Mathematics were obtained by combining results in Arithmetic Computation, Arithmetic Concepts, and Arithmetic

Applications. The Language Test was used for English Achievement while Social Studies and Science Achievement were measured by the Stanford Tests in these areas. Spelling was not used in the statistical analysis since it was not considered as an independent course in this study.

The pre- and post-class achievement means are shown in Appendix E, Tables 9 and 10. Analysis of variance (Appendix E, Tables 11 and 12) revealed no significant differences among either the pre- or post-achievement means.

STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS

The pre- and post-test class attitude means were obtained from the Remmers Scale to Measure Attitude Toward Any School Subject (Appendix E, Tables 13 and 14). Analysis of variance indicated no significant differences in either the pre- or post-tests. (Appendix E, Tables 15 and 16).

STUDENT RATINGS OF THEIR TEACHERS

The class means, in raw score form, for the first and last cycle of student ratings are listed in Appendix E, Tables 17 and 18. Statistical analysis of these means is reported in Appendix E, Tables 19 and 20. No significant differences were found.

Cornell scalogram analysis also was performed on the Hayes Pupil-Teacher Reaction Scale (Appendix B). The response categories of the Hayes scale were dichotomized for scoring purposes prior to applying scalogram analysis. The justification for combining categories for scoring purposes is that verbal habits of people differ. The meaning of "extremely clear" to some is the equivalent of the meaning of "very clear" to others. These two categories might be combined for scoring purposes and given the weight of one. Likewise, the meaning of "sometimes" might mean to some what "seldom" means to others. The preceding two categories might be combined and given a weight of zero.

The rule followed to combine response categories was to draw a line between the responses so as to minimize the number of pupils in the low group above the line and number of pupils in the high group below the line (12). Item one was analyzed as follows:

Item	Original Weights	Low 25%	High 25%
This teacher makes the lesson clear in the first few minutes of class.			
a Always	3	58	412
b Usually	2	280	214
c Sometimes	1	276	13
d Seldom or Never	0	27	2

Pupil responses were scored first using the above weights. Then, based on total scores, the lowest 25% of the pupils and the highest 25% were determined. Next, categories were combined so that responses "a" and "b" were recorded as "1" and responses "c" and "d" were recorded as "0" for this item.

The same procedure was repeated for all items and the following scoring key resulted:

Item	Responses Scored as 1	Responses Scored as 0
1	a	b, c, d,
2	a, b	c, d
3	a	b, c, d,
4	a, b	c, d
5-6	a	b, c, d,
7	a, b	c, d
8-9	a	b, c, d,

The above key resulted in a maximum possible score of nine or a minimum score of zero in content.

Cornell scalogram analysis was then performed as follows (28):

1. The IBM cards were arranged into rank order by total scores from high to low.

2. A table was prepared with:
   a. One row for each person's score, using the rank order arrived at in step one above.
   b. One column for each category of each question.

3. The responses of each person were indicated on the table by placing a check (✓) in the appropriate column for each item opposite the row representing the total score of that person.

4. Then the frequencies for each category were totaled. The sum of the frequencies in both categories for each question had to equal the total number of subjects answering the questionnaire.

5. Cutting points were placed for each item at the place in the rank order where the most common response changed from a favorable category to a non-favorable one. Cutting points were established to minimize error.

6. The errors were totaled for each item using the cutting points to determine which responses fell outside the established patterns.

7. The coefficient of reproducibility for each item was computed by dividing the number of errors (for that item) by the total number of subjects and subtracting the result from one.

8. The marginals (percent of people who answered each item favorably) were computed for each item

Appendix E, Tables 21 and 22 show a sample of the coefficients of reproducibility and marginals resulting from scalogram analysis of the first two ratings in the fall.

The marginals (or percentage of the items answered favorably) ranged from .24 to .79 with an average .49 marginal. Item one had a marginal of .34 which meant that the coefficient of reproducibility could not be less than .66 for this item. The coefficient of reproducibility was .83 for this item.

Also the marginal for item seven was .63. This meant that the coefficient of reproducibility for this item could not fall below .63. A coefficient of reproducibility of .78 was obtained for this item. This represents a gain of .15 over the minimum obtainable reproducibility. The average minimum marginal reproducibility for all nine items was .69 compared to the .80 average coefficient of reproducibility.

When intensity analysis was performed, a point was found which divided the sample into those with favorable and those with unfavorable attitudes. This point was zero for both the spring and fall intensity analyses, indicating any score but zero was a favorable attitude on the part of the students toward their teachers' effectiveness (Figures 1 and 2 on the following pages).

FIGURE 1
INTENSITY CURVE FOR CYCLES 1, 2, 3 AND 4
HAYES PUPIL-TEACHER REACTION SCALE

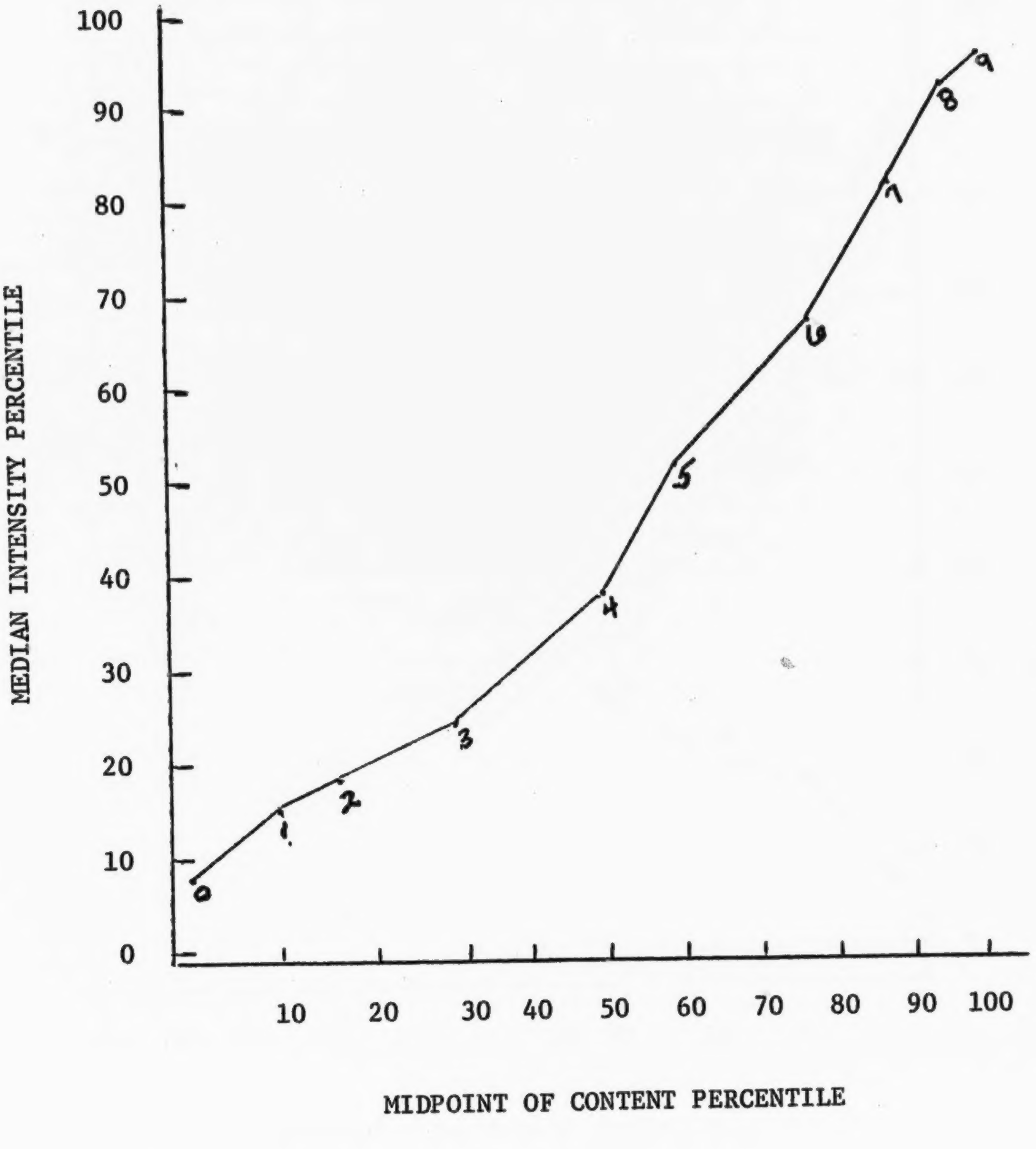
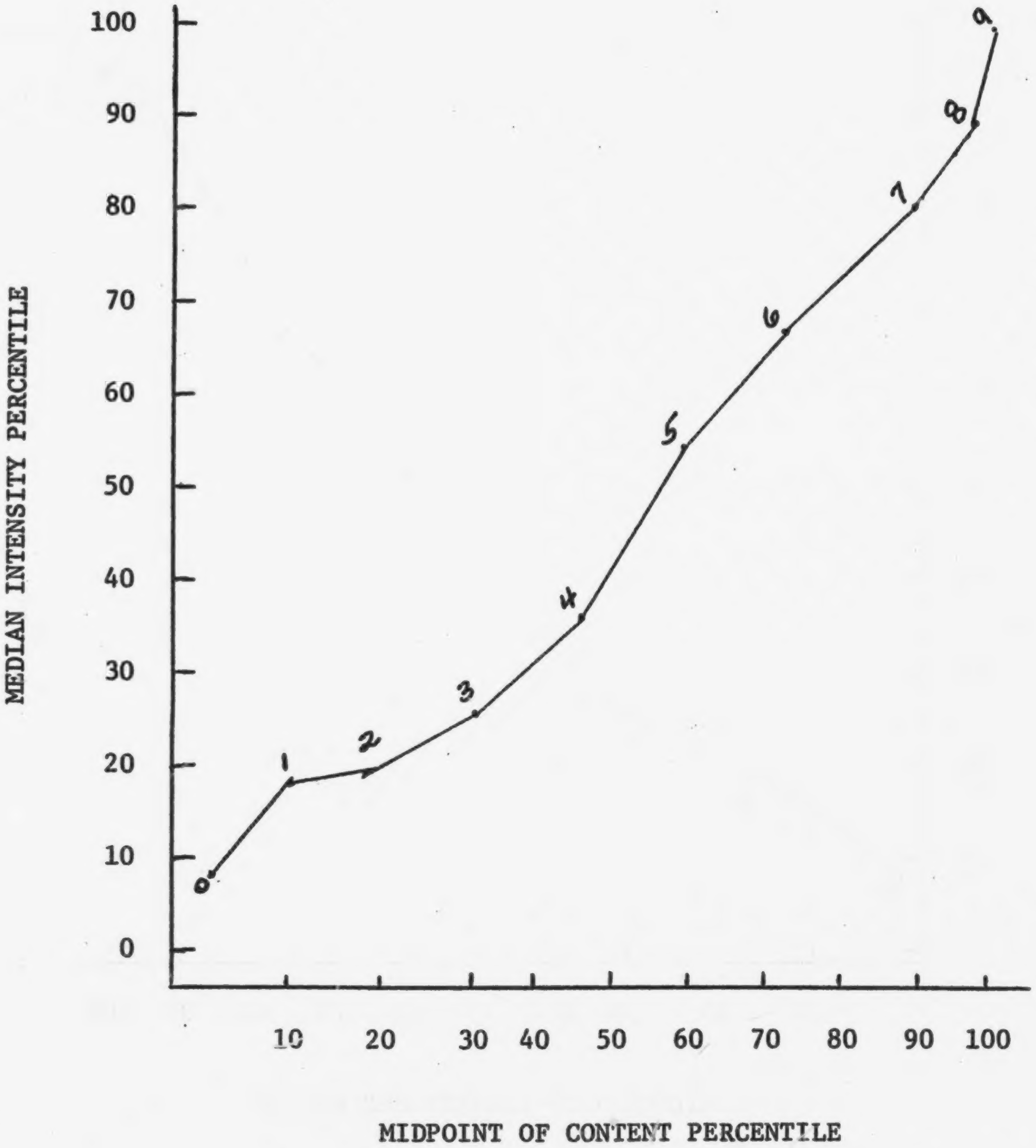


FIGURE 2
INTENSITY CURVE FOR CYCLES 5 AND 6
HAYES PUPIL-TEACHER REACTION SCALE



The foldover technique was used to determine intensity scoring. The answers to each item were dichotomized. An item answered with "a" or "d" was scored as "1", and an item answered with "b" or "c" was scored as "0". The rationale for this technique is that a student answering an item with "a" or "d" feels more intensely favorable or unfavorable toward an item than one who answers with "b" or "c". This technique meant that intensity scores ranged from zero to nine.

The intensity and content scores (based on the number of favorable replies) were then recorded in a matrix. The cumulative percentiles were computed for content scores and then the midpoints of content percentiles were computed. Next, the cumulative percentiles for intensity scores were computed and the median intensity for each content score was computed. The median intensity for each content score was then plotted against the corresponding midpoint for content percentile.

Appendix E, Table 23 contains the intensity table for a combination of the fall visitation cycles, and Table 24 contains the intensity scores for the spring cycles.

INTERACTION ANALYSIS

The large I/D (ratio of indirect to direct teacher talk) and revised i/d (motivation versus control) fall and spring ratios were investigated by analysis of variance to determine the change in interaction as a result of the feedback process. Appendix E, Tables 25 and 26 contain the ratios used in this investigation.

No significant differences materialized for either I/D or the revised i/d. Appendix E, Tables 27, 28, 29, and 30 report the results of this analysis.

Analysis of variance, two-way classification by type of feedback and treatment, failed to produce any statistically significant results when applied to measures taken from each teacher's matrix. These measures were: extended indirect, extended student talk, I/D for rows 8 and 9, revised i/d for rows 8 and 9 and the 3,3 cell.

Interaction analysis results, giving the range of scores and percentages of time teachers spent in each of the ten categories of Flanders' matrix, are shown in Appendix E, Tables 31 and 32.

MINNESOTA TEACHERS ATTITUDE INVENTORY (MTAI)

The pre- and post-test scores of the MTAI (Appendix E, Tables 34 and 35) were examined by analysis of variance, two-way classification by treatments and feedback.

The post-test analysis did not yield any significant results in the treatments or feedback. Appendix E, Tables 34, 35 and 36 comprise the findings of these analyses.

CORRELATION COEFFICIENTS

Coefficients of consistency for results on various administrations of the Hayes Pupil-Teacher Reaction Scale range from .58 to .85 (Appendix E, Table 37). Additional correlations are contained in Appendix E, Table 38.

Student achievement (Stanford) and teacher attitude toward pupils (MTAI) had correlations of -.16 at the beginning of the year and -.004 at the end of the school year. Student attitude toward school subjects (Remmers Scale) and student achievement (Stanford) correlated -.27 at the beginning of the year and -.33 at the end of the school year.

The correlation between student attitude toward teaching of teachers as measured by the Hayes Pupil-Teacher Reaction Scale and student attitude toward school subjects (Remmers) was .37 at the beginning of the year and .45 at the end of the school year. Negative correlations were obtained between teacher attitude (MTAI) and student attitude toward school subjects (Remmers).

End of year principals' ratings of their teachers correlated .59 with teacher attitude toward pupils as measured in April 1967 by the MTAI. Principals' ratings also correlated at .27 with student attitude toward teaching effectiveness as measured in April by the Hayes Pupil-Teacher Reaction Scale.

RESULTS - PART THREE

The analysis of data in part two of the results were based on class means of intact classes because of the necessity to randomize the sample in this manner.

The investigators also decided to analyze certain data further using the results for individual students. Since students were selected for their respective classes by local administrators several months before classes were randomly assigned to treatments, there was no bias on the part of the investigators in student selection.

ACHIEVEMENT

The individual results of the Stanford pre- and post-test achievement scores were subjected to analysis of variance two-way classification (Appendix E, Tables 39 and 40):

The analysis on pre-test scores revealed treatments to be significant at the .10 level and post-test scores significant in both treatments and type of feedback at the .10 level.

The post-test scores were also investigated by analysis of covariance using the pre-test results as the covariate (Appendix E, Table 41). The significant level of treatments remained at the .10 level. However, the type of feedback and interaction in the covariance analysis were significant at the .01 level.

The adjusted means for type of feedback were further analyzed by Winer's F Test for multiple comparison of means. (20)

It was found that in face-to-face feedback, treatment four was significantly different in achievement from treatment two at the .01 level and treatment three was significantly different from treatment two at the .05 level. These differences are shown as follows:

Face-to-Face Feedback

Treatment	Means	Differences 4	3	1	2
4	64.08		.97	1.15	2.31**
3	63.11			.18	1.34*
1	62.93				1.16
2	61.77				

** Significant at .01 level
* Significant at .05 level

In the analysis of written feedback only, it was found that achievement in treatment one was higher than in treatments two, three and four at the .01 level of significance. This can be seen in the following:

Written Feedback

Treatment	Means	Differences 1	2	3	4
1	66.83		2.01**	2.69**	3.00**
2	64.82			.68	.99
3	64.14				.31
4	63.83				

** Significant at .01 level

When the adjusted means for the written feedback only were compared to the face-to-face feedback adjusted means, significant differences at the .01 level were found as indicated below by the double asterisk:

Written Feedback

	Treatment		1	2	3	4
			66.83	64.82	64.14	63.83
		Means	Differences			
	4	64.08	2.75**	.74	.06	.25
Face-to-Face	3	63.11	3.72**	1.71**	1.03	.72
Feedback	1	62.93	3.90**	1.89**	1.21	.90
	2	61.77	5.06**	3.05**	2.37**	2.06**

** Significant at .01 level

STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS

Student attitude toward school subjects was investigated in fall and spring by analysis of variance two-way classification, by treatment and type of feedback (Appendix E, Tables 42 and 43).

The fall analysis was significant at the .05 level for treatments only. The spring analysis detected no significant differences in student attitude.

No significant differences were found in the analysis of covariance of post-test scores using the pre-test score as the covariate (Appendix E, Table 44).

STUDENT RATINGS OF THEIR TEACHERS

Individual student ratings of their teachers were investigated in the fall and spring by analysis of variance (Appendix E, Tables 45 and 46).

There were no significant differences found in the fall analysis. However, significant differences in the spring analysis were disclosed in type of feedback and interaction at the .01 level.

The student ratings of their teachers in the spring were examined by analysis of covariance using the student ratings in the fall as the covariate (Appendix E, Table 47).

The analysis of covariance revealed significant differences in student ratings at the .05 level for treatments, while differences in both type of feedback and interaction were significant at the .01 level.

The adjusted means were analyzed by Winer's method of multiple range testing. (20)

In the analysis of adjusted means for treatments, treatment three and treatment one were found to be significantly different than treatment four at the .05 level. The differences were as follows:

Differences in Adjusted Treatment Means

		Differences			
Treatment	Means	3	1	2	4
3	4.71		.01	.25	.31*
1	4.70			.24	.30*
2	4.46				.06
4	4.40				

* Significant at .05 level

In the examination of adjusted means for face-to-face feedback, the difference between treatment three and treatment four was significant at the .01 level. In addition, treatment three was significantly different from treatment one, and treatment two also was significantly different from treatments one and four at the .05 level.

Face-to-Face Feedback Means Differences

Treatment	Means	Differences 3	2	1	4
3	4.54		.02	.31*	.36**
2	4.52			.29*	.34*
1	4.23				.05
4	4.18				

** Significant at .01 level
* Significant at .05 level

The investigation of written feedback only revealed significant differences at the .01 level between treatments one and four, treatments one and two, and treatments three and two. Significant differences at the .05 level were shown to be between treatment one and treatment three, and between treatment three and treatment four. This can be seen in the following summary:

Written Feedback Means Differences

Treatment	Means	Differences 1	3	4	2
1	5.16		.27*	.54**	.76**
3	4.89			.27*	.49**
4	4.62				.22
2	4.40				

** Significant at .01 level
* Significant at .05 level

When the adjusted means for the written feedback only were compared to the face-to-face feedback adjusted means, significant differences at the .01 level were found as indicated below by the double asterisk:

Means Differences Between Written Feedback and Face-to-Face Feedback

	Treatment		1	3	4	2
			5.16	4.89	4.62	4.40
		Means	Differences			
	3	4.54	.62**	.35**	.08	.14
Face-to-Face Feedback	2	4.52	.64**	.37**	.10	.12
	1	4.23	.93**	.66**	.39**	.17
	4	4.18	.98**	.71**	.44**	.22

** Significant at .01 level

DISCUSSION

The consistency of student attitude toward teaching of teachers as measured by the Hayes Pupil-Teacher Reaction Scale tended to support previous research that students are reliable raters. The correlation between student rating of teachers and principal's ratings of teachers indicated reasonable validity for student ratings. Cornell scalogram analysis produced an average coefficient of reproducibility of .82 for the items on the Hayes Scale. Intensity analysis indicated that an attitude score greater than zero was a favorable attitude toward the teaching of teachers as measured by the Hayes Scale. The average percent pro (favorable) was .50 for this study. The items on the Hayes Scale could be consistently rank ordered along a continuum with the item marginals or favorable response proportions ranging from .24 to .79. A significant correlation (.45 on class means) was obtained between student ratings of their teachers' teaching and student attitude to toward school subjects.

The conclusions concerning achievement and attitudes vary somewhat depending on whether or not one is willing to accept only results based on statistical analysis when class means are used as the basic observations. The conservative answer to this question is to use class means for statistical analysis since intact classes were randomly assigned to treatments. On the other hand, a case could be made for analysis of individual scores, since assignment of students to classes by school administrators was done several months prior to random assignment of intact classes by the investigators who were from outside the involved school systems.

CONCLUSIONS

In this study when class means were used to analyze the data, student achievement and student attitude toward school subjects was not improved significantly by systematically providing feedback to teachers of (1) pupil reaction to the teaching of their teachers, or (2) results of classroom interaction analysis using Flanders' procedures, or (3) a combination of pupil reactions and classroom interaction analysis. As measured in this study neither student achievement nor student attitude toward school subjects were significantly correlated with attitudes of teachers toward their pupils. Also, when class means were used to analyze the data, there were no significant achievement or attitudinal differences between face-to-face feedback and standardized feedback via mail.

When individual scores were analyzed, significant results in achievement were obtained in favor of written feedback only over face-to-face plus written feedback. Also, when individual student ratings of the teaching of teachers were analyzed, significant differences resulted in favor of: (1) written feedback only and (2) treatments 1 and 3 versus 4. (It is noted that a common element in treatments 1 and 3 was feedback to teachers of results of student rating, whereas teachers in treatment 4 received only pre-test results for pupil achievement and attitude toward school courses.) Analysis of individual scores in classes whose teachers received written feedback only, indicated significant differences favoring treatment 1 over each of the other three treatments in both student achievement and student ratings of teachers.

Most teachers felt that the benefits derived from both pupil ratings and classroom interaction analysis warranted their wide use in teacher in-service programs.

IMPLICATIONS

It appears necessary to provide frequent and intensive help to teachers in order to change teacher behavior and to improve teacher effectiveness. The teacher questionnaire results indicated that both the Flanders classroom interaction analysis and Hayes Pupil-Teacher Reaction Scale may be useful instruments in providing insight to teachers as to how they can improve their teaching. It should be noted that the Hayes Scale takes only a few minutes to administer and to analyze and yet provide a reliable, reasonably valid way to help teachers improve their teaching.

SUMMARY

The purpose of this study was to determine if student achievement and student attitude toward school subjects in the sixth grade:

1. Can be improved significantly by systematically increasing feedback to teachers concerning pupil reaction to their teaching.
2. Can be improved significantly by systematically increasing feedback to teachers concerning reaction of trained observers to their teaching.
3. Correlate significantly with attitude of teachers toward their pupils.
4. Can be improved to a greater degree by face-to-face feedback to teachers than by standardized feedback via mail.

In treatment 1, students rated their teachers four times in the fall. After these ratings, half the teachers were mailed feedback and the other half received face-to-face feedback as well as written feedback. This feedback included class frequencies and averages for each item on the pupil-teacher reaction scale. In the spring, the students rated their teachers twice. There was an interval of two and one-half months between the last fall and the first spring rating.

Treatment 2 involved systematic recording of classroom teacher-pupil interaction (by two carefully trained observers) four times in the fall and twice in the spring. An interval of about four months existed between the two types of feedback in the fall and the first spring observation.

In treatment 3, teachers received feedback of both student ratings (as in treatment 1) and observations based on classroom interaction analysis (as in treatment 2). Both kinds of feedback were based on two visitations in the fall semester and once in the spring semester. There was a 20-week interval between the fall and spring feedback.

In treatment 4, although teachers were rated by their students and observed twice in the fall and once in the spring, they received feedback only on the pre-test results for pupil achievement and attitude toward subjects. Teachers in treatments 1, 2, and 3 also received the same kinds of information provided teachers in treatment 4.

In the analysis of the data using class means, no significant differences were found in achievement or attitudinal means.

When individual scores were analyzed, significant differences were found in the student ratings of the teaching of teachers. The preceding results favored treatments 1 and 3 over treatments 2 and 4 at statistically significant levels. Also, when individual achievement scores and student ratings were analyzed, written feedback tended to be more effective than face-to-face feedback. Analysis of individual scores in classes whose teachers received written feedback only, indicated significant differences favoring treatment 1 over each of the other three treatments in both student achievement and student ratings of teachers.

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APPENDIX A

INTERACTION ANALYSIS: A PROGRAM FOR INTERPRETATION OF MATRICES

Directions: See "Categories for Interaction Analysis" on last page and then return to Phase I below.

PHASE I - INTRODUCTION TO MATRIX

The observer becomes familiar with the classroom atmosphere before beginning to record interaction. Once the observer begins recording numbers, he categorizes the classroom interaction every three seconds or every time a change in categories occurs. After the observer ceases recording, he has a list of category numbers which is the raw interaction data. In order to interpret this data, he can produce a systematic summarization by entering the category numbers into a matrix. The matrix preserves the sequence pattern of events, but does not preserve the temporal order of events.

1-1 The matrix could best be described as preserving:

(a) Temporal order of events
(b) Quantified sequence of events
(c) Nonverbal behavior

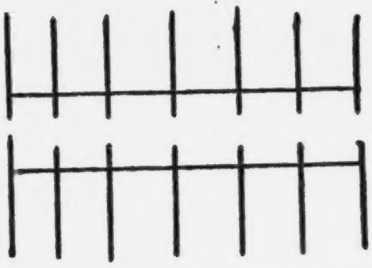
(b)

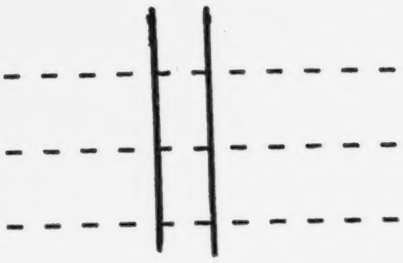
This is a Matrix.

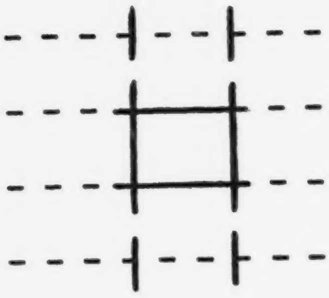
	1	2	3	4	5	6	7	8	9	10	Total
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
Total											

APPENDIX A (CONTINUED)

The matrix consists of 10 rows and 10 columns. The rows run horizontally and the columns run vertically. Each unit in the matrix is called a cell.





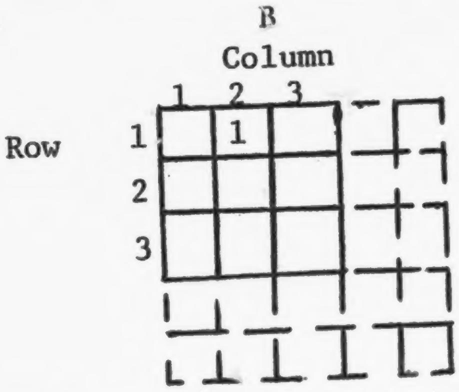


1-2 A matrix consists of 10 _______ and 10 _______.	rows and columns
1-3 Each unit in the matrix is called a __________.	cell
1-4 The rows run ____________ and the columns run __________.	horizontally and vertically

Filling in a matrix is called tabulating or tallying. After he has recorded his raw data (See A) in the classroom, the observer begins to tabulate the raw data into the matrix. To tabulate into a matrix, the observer must use the first number he has recorded as the row number, and the second number as the column number. For example, if the first number is "1" and the second number is "2", enter a tally mark into the matrix in row one, column two (See B). It is important to note that this pair of numbers is recorded as one tally.

A

Row 1
Column (2
3
4
8
8
2
3



1-5 Filling in a matrix may be described as __________________.	tabulating or tallying

APPENDIX A (CONTINUED)

1-6	In a consecutive pair of numbers, the first is called the ________ number.	row
1-7	The second number is called the ______ number.	column
1-8	Each Tally in the matrix represents _____ recorded numbers.	two
1-9	If a consecutive pair of numbers is 2 and 4, then the row number is ____ and the column number is ____.	2, 4
1-10	The cell in which the above pair of numbers is placed is called the ________ cell.	2,4

In the example of a segment of classroom interaction (See C) we notice that each number is used twice.

	C	
	1	Row
Row	2	Column
Column	3	Row
Row	4	Column
Column	8	Row
Row	8	Column
Column	2	

1-11	The column number of the first pair becomes the _____ number of the second pair.	row
1-12	Using the same procedure, we can see that the third pair of numbers has as its row number the number ____ and as its column number the number _______.	3 4
1-13	The fourth pair of numbers has as its row number the number ______ and as its column number the number ___.	4, 8
1-14	The tabulation or tally for the fourth pair of numbers would therefore be placed in the ______ cell.	4,8

PHASE II - APPLICATION OF RAW DATA TO MATRIX
(Refer to Figure 1)

We shall now construct a matrix from a summarization of data obtained from a 15-minute class period.

APPENDIX A (CONTINUED)

Example: Teacher: "John, What day of the week is it?"
John: "Today is Friday."

This dialogue would be categorized as a 4,8, and one tally or tabulation would be placed in the 4,8 cell.

2-1 The 4,8 cell is located at the intersection of ______4 and ________ 8.	row column
2-2 If there were 16 such interactions during the class period, we would place the number ________ in the 4,8 cell.	16
Directions: Insert the given number of tallies in their proper cells to complete the practice matrix. (Figure 1)	
2-3 The teacher has interrupted his lectures with questions 9 times. The 9 would be placed in row ______, column ______. Place 9 tallies in the 5,4 cell.	5 4
2-4 The teacher has continued to lecture after asking a question 4 times. These tallies belong in row ______, column _______. Place 4 tallies in the proper cell.	4, 5
2-5 The teacher has asked extended or long questions 11 times. These tallies go in row ______, column ____. Enter the tallies in the proper cell.	4, 4
2-6 The students have responded to direct questions with a narrow, factual answer 44 times. You can summarize this particular interaction by placing the number ______ in row 4, column 8. Enter the tallies in the proper cell.	44
2-7 There were no responses to teacher questions in which the students presented their own ideas; therefore, there are _____ tallies in cell 4,9.	no
2-8 A factual student response was followed 29 times by teacher praise or encouragement. The number 29 goes into the ______ cell. Enter the tallies in the proper cell.	8,2

APPENDIX A (CONTINUED)

2-9 A factual student response is followed by a teacher question 13 times. The number 13 would be placed in row _____, column _____. Enter the tallies in the proper cell.	8, 4
2-10 A factual student response is followed by teacher directions 12 times. The number 12 is placed in the _____ cell. Enter the tallies in the proper cell.	8,6

INCOMPLETE PRACTICE MATRIX

Figure 1

	1	2	3	4	5	6	7	8	9	10	Total
1											
2		2	2		12	5	1				
3		1		3	1	2					
4		2				6	1				
5		2			18	14					
6		2		7	6	16		23		6	
7					1						
8								28			
9											
10				4		5				14	
Total											

APPENDIX A (CONTINUED)

PHASE III - INTERPRETING CLASSROOM INTERACTION FROM THE "FRINGE" MATRIX DATA

We now have an idea of how raw data is entered into the matrix. We can now quantitatively analyze the data that we have in the matrix by working with the "fringe" or border areas of the matrix. (Refer to Figure 2.)

The first data that can be taken from the fringe area is the percentage of the total interaction in each column. This is found by dividing the number of tallies in each column by the total number of tallies which in this case is 343. (See Figure 2.)

3-1 The greatest proportion of interaction is found in column ________.	8
3-2 The percentage of interaction in column 8 is _____.	28%
3-3 The smallest proportion of interaction is found in column _____ and _____.	1, 9
3-4 The percentage of interaction in column 1 is _____. In column 9 the percentage is also _____.	0 0
Referring to Figure 2, we notice that we have calculated percentages for each column. From the column percentages we can find the percentage of "teacher talk" by adding columns 1-7.	
3-5 The percentage of teacher talk is _____. This means that the teacher talked 66% of the time in that class.	66%
3-6 We can find percentage of student talk by adding columns _______ and ______.	8, 9
3-7 The percentage of student talk is ______.	28%
3-8 The percentage of total talk in the classroom can be found by adding ___________.	rows 1-9 or teacher talk plus student talk

In order to determine the nature of the teacher's influence on the students, we calculate the ratio of the indirect teacher influence (sharing, praising, accepting, questioning) to the direct teacher influence (lecturing, commanding, criticizing). This is called an I/D Ratio. The indirect teacher influence columns are 1 through 4, and the direct teacher influence columns are 5 through 7.

$$I/D = \frac{1+2+3+4}{5+6+7}$$

To calculate the total number of indirect tallies we add columns 1 through 4.

3-9 The total number of indirect tallies in the sample matrix is _____.	113
3-10 The total number of direct teacher influence tallies in the sample matrix is _____.	112
3-11 If we divide the indirect tallies by the direct tallies, we get an _____ ratio of _____. For example, if a teacher has 213 tallies in rows 1-4 and 5-7, this would give an I/D ratio of $\frac{213}{213}$ which equals 1.	I/D, 1.008

An I/D ratio of 1.00 means that for every indirect teacher-influence statement, there was one direct teacher-influence statement.

3-12 A teacher had 200 indirect statements and 100 direct statements. His I/D ratio is _____.	2
3-13 An I/D ratio of 2.00 would mean that for every two indirect teacher-influence statements, there was _____ direct teacher-influence statement.	one
3-14 An I/D ratio less than 1.00 would mean that the teacher is more _______ than indirect in his influence on the students.	direct
3-15 Therefore, a more indirect teacher would have a ______ I/D ratio than a more direct teacher. (a) higher (b) lower	(a) higher

APPENDIX A (CONTINUED)

A revised I/D ratio, sometimes written as small i/d ratio, can be used to determine teacher emphasis on motivation and control. In this ratio, the number of tallies in columns 1, 2 and 3 is divided by the number of tallies in columns 6 and 7.

$$i/d = \frac{1+2+3}{6+7}$$

3-16 The revised i/d differs from the I/D ratio in that we omit columns _____ and _____.	4, 5
3-17 The revised i/d ratio is less concerned with actual presentation of subject matter and more concerned with __________ and __________.	motivation, control
3-18 The revised i/d ratio for our practice matrix is ______________.	$\frac{45}{66} = \frac{1-3}{6-7} = .681$
3-19 The above revised i/d ratio indicates that the teacher used more _____ teacher influence than ______ teacher influence in motivating and controlling the students because the i/d ratio is less than 1.	direct indirect
3-20 If the same teacher would have had a revised i/d larger than one, then we would say that in matters of motivation and control the teacher's influence was usually ________.	indirect

Our final I/D is called the I/D ratio for rows 8 and 9 or I/D 8,9. This ratio is found by adding the tallies in rows 8 and 9, columns 1 through 4 and dividing this number by the tallies in rows 8 and 9, columns 5 through 7. The type of teacher reaction, direct or indirect, to student talk is recorded by this ratio.

3-21 In columns 1-4 the tallies in rows 8-9 represent ___. (a) The direct portion of rows 8 and 9 (b) The indirect portion of rows 8 and 9	(b)
3-22 In columns 5-7 the tallies in rows 8-9 represent ___. (a) The direct portion of rows 8 and 9 (b) The indirect portion of rows 8 and 9	(a)
3-23 I/D 8,9 for the practice matrix is __________.	$\frac{47}{20} = 2.31$
3-24 The I/D 8,9 gives us some idea of the type of teacher response to student ______.	talk

APPENDIX A (CONTINUED)

3-25 The high I/D 8,9 for our practice matrix would indicate that the teacher used _______ influence more than ______ influence in his responses to student talk.	indirect direct

COMPLETE PRACTICE MATRIX "FRINGE" DATA

Figure 2

TEACHER I

		1	2	3	4	5	6	7	8	9	10	Total
INDIRECT INFLUENCE	1											0
	2		2	2	16	12	5	1				38
	3		1		3	1	2					7
	4		2		11	4	6	1	44			68
DIRECT INFLUENCE	5		2		9	18	14				3	46
	6		2		7	6	16		23		6	60
	7				5	1						6
STUDENT TALK	8		29	5	13	4	12	4	28			95
	9											0
SILENCE	10				4		5				14	23
	T	0	38	7	68	46	60	6	95	0	23	343
	%	0	11	2	20	13	18	2	28	0	6	
		INDIRECT INFLUENCE				DIRECT INFLUENCE			STUDENT TALK		SILENCE	

Total Talk = 94% I/D = 1.008

Teacher Talk = 66% i/d = .68

Student Talk = 28% I/D 8,9 = 2.31

APPENDIX A (CONTINUED)

PHASE IV - INTERPRETING INTERACTION FROM THE "CORE" OF THE MATRIX

Now that we have examined the interpretations that can be made from the "fringe" areas of the matrix, we can turn to interpretations that can be made from the buildup of tabulations in individual cells and certain areas within the matrix. For this purpose we will use Figure 3 which outlines particular areas of the matrix with which we are concerned. We can then refer to the data in Figure 2 to give these areas practical significance.

If you will look at Figure 3, you will see a shaded area in the form of a cross in rows 4 and 5, columns 4 and 5. This area is called the content cross. Tallies in this area represent teacher lecture or teacher asking for information. Therefore, this area indicates teacher emphasis on subject matter.

4-1	The "content cross" covers rows ____ and ____ horizontally and columns ____ and _____ vertically.	4, 5 4, 5
4-2	We also notice that there is an area A at the intersection of the cross. This area shows us the amount of extended teacher ________ and _______.	lecture, questions
4-3	Turn to Figure 2. Looking at area A, we notice that the 5,5 cell contains 18 tallies. This means that there were 18 pairs of 5,5 combinations or 18 instances of extended ________ __________.	teacher lecture
4-4	An interaction such as this, lecture followed by lecture or praise followed by praise, is called "steady-state." Therefore, the 5,5 cell would be called a _____________ cell.	steady-state
4-5	Another "steady-state" cell in the "content cross" is the _______ cell.	4,4
4-6	Are there any other "steady-state" cells within the "content cross"? (a) Yes (b) No	No

There are ten "steady-state" cells in the entire matrix. These are the 1,1, 2,2, etc., through 10, 10 cells from the upper left diagonally to the lower right of the matrix. Entries in "steady-state" cells indicate that the speaker has remained in a particular category for more than 3 seconds. All other cells are "transition" cells.

APPENDIX A (CONTINUED)

4-7	The 5,4 cell is a _________ cell.	transition
4-8	The only other "transition" cell in area A is the _______ cell.	4,5
4-9	The 5,4 cell shows a transition from teacher lecture to teacher _________.	question
4-10	The 4,10 cell shows a transition from _______ _________ to __________.	teacher question silence

Focusing our attention to the right-hand side of the matrix in Figure 3, we see area B. This is the area of student response. By looking at the tallies in the separate cells in columns 8 and 9, rows 1 through 7, we can tell what stimulated or initiated student talk.

4-11	In order to determine what initiated student talk, we should look at columns ____ and ____, rows _______ through ______.	8, 9 1, 7
4-12	The 44 tallies in the 4,8 cell in our practice matrix (Figure 2) indicate that 44 times student talk was initiated by teacher ________.	questions
4-13	The 44 tallies in the 4,8 cell indicate memory-type teacher ________ followed by factual, narrow student ________.	questions answers
4-14	The 23 tallies in the 6,8 cell indicate teacher __________ followed by student _________.	directions responses
4-15	The 8,8 cell is a _______________________.	"steady-state or extended student talk
4-16	The 28 tallies in the 8,8 cell indicate amount of student responses that were longer than ____ seconds in duration.	3

APPENDIX A (CONTINUED)

Just as area B in Figure 3 shows what initiated student talk, area C (rows 8 and 9, columns 1 through 7) shows the type of teacher response that followed student talk.

4-17 Since all of the student responses in our practice matrix (Figure 2) were factual, narrow responses, all of the tallies in area C are in row ______.

8

4-18 In Figure 2 the teacher has usually responded to student answers with praise. We find this by looking at cell ________.

8,2

4-19 Cell 8,2 has ________ tallies.

29

4-20 Cell 8,3 has ________ tallies.

5

4-21 If we compare cells 8,2 and 8,3 in Figure 2, we would say that the norm for this teacher is ________.

(a) The teacher uses student ideas, elaborating and expanding on them and integrating them into the lesson.
(b) The teacher praises the students for giving the predetermined answer and then continues with his lesson.

b

Moving next to the area designated as D in Figure 3, which is referred to as the extended direct area, we have cells showing criticism -- directions sequences. This area also shows the vicious circle sequence in which the teacher gives a direction, the student resist, the teacher criticizes and gives another direction, etc.

4-22 Tallies in the "vicious circle" reflect upon ____.

(a) classroom management and control
(b) subject matter content

a

4-23 The practice matrix (Figure 2) shows that _____.

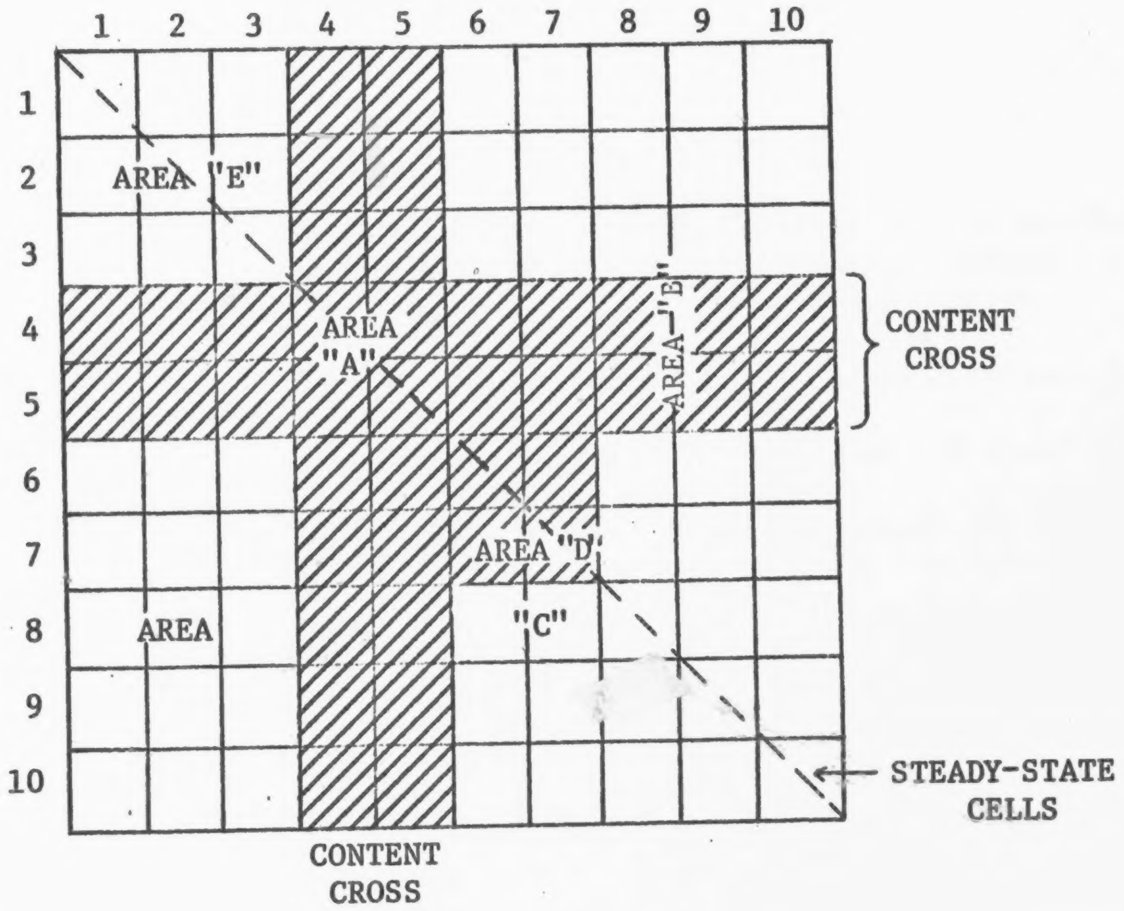
(a) students did resist directions and were criticized
(b) students did not resist directions

b

APPENDIX A (CONTINUED)

MATRIX CODE AREAS

Figure 3


1
2
3
4
5
6
7
8
9
10
AREA "E"
AREA "A"
AREA "B"
AREA "D"
AREA
"C"
CONTENT CROSS
STEADY-STATE CELLS
CONTENT CROSS

4-24	The term "vicious circle" __________. (a) would apply to the practice matrix (Figure 2) (b) would not apply to the practice matrix (Figure 2)	b
4-25	Area E in Figure 3 shows us the amount of extended _________ teacher influence. (a) indirect (b) direct	indirect
4-26	The tallies in the 2,3 cell indicate a transition in teacher behavior from _____ to _____ of student ideas.	praise acceptance
4-27	Judging from the number of tallies in the 3,3 cell in Figure 2, we can assume that teacher acceptance and use of student ideas occurred _________. (a) frequently (b) infrequently (c) never	c

APPENDIX A (CONTINUED)

COMPLETE PRACTICE MATRIX "FRINGE" DATA

Figure 4

TEACHER II

		1	2	3	4	5	6	7	8	9	10	Total
INDIRECT INFLUENCE	1		1			1						2
	2	1	4	5	6	2	1			4		23
	3		1	9	3	4	2			3		22
	4				4	1	1		22	4	3	35
DIRECT INFLUENCE	5		1	1	9	27	4			8		50
	6		1		2	2	3		2	2	1	13
	7					1	2	1				4
STUDENT TALK	8		8	5	7	6			26			52
	9	1	7	2	1	6		3		9	2	31
SILENCE	10				3				2	1	2	8
	T	2	23	22	35	50	13	4	52	31	8	240
	%	1	9	9	14	21	6	2	22	13	3	
		INDIRECT INFLUENCE				DIRECT INFLUENCE			STUDENT TALK		SILENCE	

Total Talk = 97%
Teacher Talk = 62%
Student Talk = 35%

I/D = 1.20
i/d = 2.8
I/D 8-9 = 2.06

APPENDIX A (CONTINUED)

PHASE V - PROBLEMS INVOLVING THE COMPARISON OF TWO MATRICES (FINAL EXAMINATION)

5-1 Which cell is used to determine extended teacher lecture?
(a) 4,4 (b) 5,5 (c) 6,6

In working the following problems, you will compare our practice matrix (Figure 2, Teacher 1) with the sample matrix (Figure 4, Teacher 2).

5-2 Which teacher, comparing teacher No. 1 with teacher No. 2, has more extended lecture?
(a) teacher 1 (b) teacher 2

5-3 Which teacher is the more indirect?
(a) teacher 1 (b) teacher 2

5-4 Does an indirect teacher necessarily spend less time on extended lecture?
(a) yes (b) no

5-5 Which teacher asked more narrow, factual questions which were followed by factual student replies?
(a) teacher 1 (b) teacher 2

5-6 Which teacher used more extended commands or directions?
(a) teacher 1 (b) teacher 2

5-7 Which teacher has more lecture followed by student talk?
(a) teacher 1 (b) teacher 2

5-8 Which teacher is more inclined to encourage or praise a student response?
(a) teacher 1 (b) teacher 2

5-9 In which ratio do these two teachers differ more?
(a) I/D (b) revised i/d

5-10 This indicates a greater difference between the two in method of:
(a) content presentation (b) motivation and control

5-11 Immediately following student talk, which of the two teachers responds more indirectly?
(a) teacher 1 (b) teacher 2

APPENDIX A (CONTINUED)

5-12 The answer to question 5-11 is determined by the:
- (a) I/D ratio
- (b) I/D 8,9 ratio
- (c) revised i/d ratio

5-13 From the I/D 8,9 ratio we can say that:
- (a) both teachers respond more indirectly than directly to student talk.
- (b) only teacher 1 responds more indirectly than directly to student talk.
- (c) only teacher 2 responds more indirectly than directly to student talk.
- (d) both teachers respond directly to student talk.

5-14 The big difference between the two teachers in area C (teacher response to student comments) can be seen by comparing:
- (a) the total number of tallies in the area for both teachers
- (b) row 9 of both teachers
- (c) the 8,8 cell of both teachers

5-15 Looking at area D, we can see some evidence of the "vicious circle" in:
- (a) teacher 1
- (b) teacher 2
- (c) neither

5-16 In Area E (extended indirect influence) we can see that teacher 2 has many more tallies than teacher 1, but the significant difference in this area can be seen in the:
- (a) 2,2 cell
- (b) 2,1 cell
- (c) 3,3 cell

5-17 Judging from the two matrices and from what you have learned, which teacher appears to be the more flexible in his teaching behavior?
- (a) teacher 1
- (b) teacher 2

5-18 In comparing the two matrices, it would seem that the students in which class had a greater freedom of speech and were not afraid to present their ideas to the class?
- (a) teacher 1's class
- (b) teacher 2's class

5-19 Which teacher asked a question that was followed by silence?
- (a) teacher 1
- (b) teacher 2

5-20 Which teacher uses questions more often during his lectures?
- (a) teacher 1
- (b) teacher 2
- (c) both use questions equally during lecture

APPENDIX A (CONTINUED)

ANSWER SHEET

5-1	b	5-11	a
5-2	b	5-12	b
5-3	b	5-13	a
5-4	b	5-14	b
5-5	a	5-15	b
5-6	a	5-16	c
5-7	b	5-17	b
5-8	a	5-18	b
5-9	b	5-19	b
5-10	b	5-20	c

APPENDIX B

HAYES PUPIL-TEACHER REACTION SCALE

DIRECTIONS

Please read these instructions first. Your sincere, thoughtful help will be appreciated.

Do not place any marks on this paper. On the IBM card print your name (last name first), your teacher's name, school name and today's date. Then indicate your reaction to each item on the IBM card with the electrographic pencil which has been provided. In using the electrographic pencil, please darken heavily the entire space for each answer which you select.

YOUR TEACHER AND SCHOOL ADMINISTRATORS WILL NOT SEE YOUR ANSWERS. The reaction of your entire class (as a group) will be given directly to your teacher by the Harrisburg Research Team.

DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

APPENDIX B (CONTINUED)

1. This teacher makes the lesson objectives clear in the first few minutes of the class:

    a. Always
    b. Usually
    c. Sometimes
    d. Seldom or never

2. She (he) really causes you to think:

    a. Most of the time
    b. Often
    c. Sometimes
    d. Seldom or never

3. Her (his) explanations are:

    a. Extremely clear and to the point
    b. Very clear and to the point
    c. Adequate, might be better
    d. Often not clear or not to the point

4. Her (his) lesson materials are:

    a. Outstanding
    b. Very good
    c. About average
    d. Definitely below average

5. Her (his) lessons provide very well for the needs, interests, and experience level of students:

    a. Always
    b. Usually
    c. About half the time
    d. Sometimes or seldom

6. Her (his) instruction if very realistic:

    a. Always
    b. Often
    c. Sometimes
    d. Seldom or never

7. Her (his) instruction is:

   a. Extremely challenging
   b. Very challenging
   c. Somewhat challenging
   d. Not very challenging or usually unchallenging

8. She (he) concludes lessons by:

   a. Capably emphasizing the main points
   b. Repeating the main points
   c. Abruptly stopping, but this does not bother me
   d. Abruptly stopping and I often wonder what I should have learned during the period

9. This teacher uses excellent examples to make ideas clear:

   a. Most of the time
   b. Usually
   c. About half the time
   d. Sometimes or seldom

10. This instructor is the very best I've ever had.

    a. Agree
    b. Disagree

11. This instructor is one of the best.

    a. Agree
    b. Disagree

12. Her (his) teaching is effective.

    a. Agree
    b. Disagree

13. Her (his) lessons are at least average or better.

    a. Agree
    b. Disagree

14. Her (his) teaching is not quite adequate.

    a. Agree
    b. Disagree

APPENDIX B (CONTINUED)

15. Her (his) lessons are poor.

    a. Agree
    b. Disagree

16. This teacher is very ineffective.

    a. Agree
    b. Disagree

17. This teacher is the worst I've ever had.

    a. Agree
    b. Disagree

18. This subject is one of the best.

    a. Agree
    b. Disagree

19. This subject is "okay".

    a. Agree
    b. Disagree

20. This subject is dull.

    a. Agree
    b. Disagree

2

APPENDIX C

Commonwealth of Pennsylvania
Department of Public Instruction
Box 911, Harrisburg, Pennsylvania 17126

April 15, 1967

TO: Teachers Who Participated in the 1966-67 Feedback Study

The attached Feedback Study Opinionnaire has been designed to obtain vital information on the opinions of each teacher who participated in the study.

Directions:

Please write your name and the treatment number to which you were randomly assigned in the space provided at the top of the opinionnaire. Read each statement carefully. If you agree with the statement, place a check-mark (✓) opposite the statement in the space beneath "Agree." If you disagree, place a check-mark opposite the statement in the space beneath "Disagree." If the statement pertains to some aspect of the study that did not apply to you, place a check-mark opposite the statement in the space beneath "Not applicable."

Please react to the statements sincerely and frankly. The identification of teachers with their opinions will be kept confidential.

APPENDIX C (CONTINUED)

Name____________________________

Treatment________________________

School__________________________

Agree	Disagree	Not Applicable
(Please Check)		

Section A: Beneficial Aspects of the Study

1. The feedback I received provided me with a critical analysis of my teaching.
2. The feedback pointed out my teaching strengths and weaknesses.
3. The feedback provided me with an objective basis for improving my teaching.
4. I gained new insights into my teaching from the training I received in interaction analysis.
5. Student interest in the observed subject was increased.
6. Test score feedback increased my understanding of my pupils.
7. Participation in study provided very little or nothing that I consider useful or helpful to me.

Section B: Disliked Features

8. I did not really want to participate in this study; I was made to feel that I was obligated to participate.
9. I gained little useful information from the feedback I received to help improve my teaching.
10. I felt ill-at-ease when my class was observed.
11. During the observations by the co-investigator, my pupils were less responsive to my teaching.

APPENDIX C (CONTINUED)

Agree	Disagree	Not Applicable
(Please Check)		

Section C: Method of Feedback

12. I would have preferred the receipt of written feedback rather than face-to-face feedback.

13. I would have preferred the receipt of face-to-face feedback rather than written feedback.

14. Face-to-face conferences helped me understand the feedback reports I received.

Section D: Attempted Changes in Teaching Performance

Based on the feedback I received, I attempted to:

15. Continue my normal teaching patterns since the feedback I received suggested no changes in my teaching that I felt would be profitable in terms of improving pupil achievement and/or pupil attitudes.

16. Make the objectives of the lessons clearer to my pupils.

17. Make my explanations and instructions clearer.

18. Improve my lesson materials.

19. Provide for the needs, interests and experience level of my pupils.

20. Provide more realistic and challenging instruction.

21. Better conclude my lessons.

22. Use a greater variety of teaching methods.

APPENDIX C (CONTINUED)

Agree	Disagree	Not Applicable	
(Please Check)			
			23. Accept the feelings of my pupils more than I previously did.
			24. Provide more praise and encouragement of my pupils for their responses and ideas.
			25. Accept and use the ideas of my students.
			26. Ask a lesser amount of memory-recall questions and a corresponding larger amount of thought-provoking questions.
			27. Lecture less and encourage more active student verbal participation in the topics under discussion.
			Section E: Interaction Analysis
			28. During the orientation/training meetings in September, I received an adequate understanding of the rationale and the purpose of this study.
			29. I received adequate training in interaction analysis to understand the feedback reports I received.
			30. Too much was covered in too short a time at the orientation/training meetings.
			31. Instruction was not sufficient for accurate interpretation of the matrices.
			32. There was too much lapse between the training sessions and receipt of feedback.
			33. Since the training I received was inadequate for me to understand the feedback reports, I had no meaningful basis for attempting to change my teaching.

APPENDIX C (CONTINUED)

Agree	Disagree	Not Applicable	
(Please Check			
			34. An adequate sample of my total verbal teaching behavior was observed in the fall to give me a basis for making decisions on whether to change my verbal teaching patterns.
			35. The lesson content of the subject selected for observation restricts the amount of teacher-student verbal interaction.
			36. In my teaching situation, I feel that direct teaching is generally more effective than indirect teaching.
c			**Section F: Student Ratings**
			37. Most of my pupils accurately rated my teaching performance.
			38. The pupil ratings of my teaching provide a reliable index of my competence as a teacher.
			39. Sixth-grade pupils are too immature to distinguish good teaching from poor teaching.
			40. Most of the pupil ratings of my teaching were probably influenced by such factors as personality differences, marks, discipline, their attitudes and general scholastic ability.
			Section G: Student Test Scores
			41. The test score information increased my understanding of my pupils.
			42. Knowledge of my pupil test scores was influential in changing my lesson plans and teaching.

APPENDIX C (CONTINUED)

Agree	Disagree	Not Applicable
(Please Check)		

Section H: Recommendations

43. The benefits of pupil ratings of teaching performance in the improvement of teaching are sufficient to suggest their widespread use by upper-intermediate grade teachers.

44. The benefits of teacher-pupil verbal interaction analysis suggests training in its use in inservice programs designed to improve teaching behavior.

APPENDIX D

TEACHER REACTIONS

BENEFICIAL ASPECTS OF THE STUDY

As can be seen in Table 1, a very large majority of the teachers felt that the feedback they received provided them with critical analyses of their teaching, pointed out their teaching strengths and weaknesses and provided them with objective bases for improving their teaching. Only five teachers felt that they gained little or nothing from their participation in the study.

Almost all of the teachers reported that they gained new insights into their teaching as a result of the training they received in the Flanders system of teacher-student verbal interaction analysis. Less than one-half of the teachers felt that student interest in the academic subject selected for observation was increased.

DISLIKED FEATURES OF THE STUDY

The sample was selected randomly from lists of volunteering sixth-grade teachers which were submitted by the seven participating school districts. Even so, according to the teachers' reactions to statement 8 of Table 2, 15 percent of the teachers did not want to participate but did so because they were made to feel they were obligated to take part.

Although most of the teachers agreed with the statement that the feedback provided them with useful information to help improve them as teachers, there were 13 teachers who disagreed. It should be noted, however, that over one-half of the teachers who disagreed received only the student achievement test scores as feedback.

Only one of the 12 teachers who felt ill-at-ease when his classes were observed felt that his pupils were less responsive to his teaching during the observations. Presumably, the responsiveness of the pupils did not seem to contribute to whether or not the teachers felt ill-at-ease, nor did the discomfort some teachers felt when they were observed seem to affect the normal responsiveness of their pupils during the observations.

APPENDIX D (CONTINUED)

TABLE 1
BENEFICIAL ASPECTS OF THE STUDY

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
1. "The feedback I received provided me with a critical analysis of my teaching."	Agree	16	19	18	-	53
	Disagree	2	1	1	-	4
	Not App.	2	-	1	20	23
2. "The feedback pointed out my teaching strengths and weaknesses."	Agree	18	16	15	-	49
	Disagree	2	4	5	-	11
	Not App.	-	-	-	20	20
3. "The feedback provided me with an objective basis for improving my teaching."	Agree	14	18	17	-	49
	Disagree	4	1	3	-	8
	Not App.	2	1	-	20	23
4. "I gained new insights into my teaching from the training I received in interaction analysis."	Agree	16	17	19	20	72
	Disagree	2	3	1	-	6
	Not App.	2	-	-	-	2
5. "Student interest in the observed subject was increased."	Agree	7	9	9	8	33
	Disagree	13	11	11	12	47
	Not App.	-	-	-	-	-
6. "Test score feedback increased my understanding of my pupils."	Agree	14	10	13	10	47
	Disagree	4	8	7	-	19
	Not App.	2	2	-	10	14
7. "Participation in study provided very little...that I consider useful...to me."	Agree	2	1	2	-	5
	Disagree	18	19	18	20	75

APPENDIX D (CONTINUED)

TABLE 2
DISLIKED FEATURES OF THE STUDY

	Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
8.	"I did not really want to participate...; I was made to feel that I was obligated to participate."	Agree	5	2	2	3	12
		Disagree	15	18	18	17	68
9.	"I gained little useful information from the feedback I received to help improve my teaching."	Agree	3	1	2	7	13
		Disagree	17	19	18	13	67
10.	"I felt ill-at-ease when my class was observed."	Agree	2	2	3	5	12
		Disagree	18	18	17	15	68
11.	"During the observations by the co-investigator, my pupils were less responsive to my teaching."	Agree	2	2	5	2	11
		Disagree	18	18	15	18	69

APPENDIX D (CONTINUED)

METHOD OF FEEDBACK

The reactions of the teachers to the two methods of feedback employed in the study (face-to-face and written) are shown in Table 3. Of the 40 teachers who received their feedback reports in face-to-face conferences with the co-investigators, only six of them would have preferred their feedback reports by mail. While six teachers would have preferred their feedback to be mailed to them, only two of the 40 teachers felt that face-to-face feedback conferences did not help them understand the feedback they received. On the other hand, 29 of the 40 teachers who received their feedback reports by mail would have preferred their feedback through face-to-face conferences.

CHANGES ATTEMPTED IN TEACHING BASED UPON FEEDBACK

Statements 15 through 27, which appear in Table 4 together with the reactions of the teachers to them, were included in the opinionnaire to determine if and what changes in teaching were attempted by teachers that were based upon the feedback they received. Statements 16-22 pertain to changes attempted which were suggested by feedback on the Hayes Pupil-Teacher Reaction Scale. Statements 23-27 pertain to changes attempted that were based upon interaction analysis feedback.

Fifty-one teachers reported that they attempted at least one change in their teaching in contrast to only nine teachers who reported that they attempted no changes. On the basis of the responses of the teachers to each statement, it is apparent that most of the teachers who received feedback on their teaching performance felt that there were areas in which their teaching could be improved and made efforts to change their teaching.

INTERACTION ANALYSIS

The reactions of teachers to statements which pertained to various aspects of interaction analysis are shown in Table 5.

Two fall orientation/training meetings were held to train each teacher in the use of the Flanders system of interaction analysis and to provide each teacher with an understanding of the rationale and mechanics of the study. Seventy-eight percent of the 40 teachers who received interaction analysis feedback felt that they had received adequate training to understand the feedback they received.

APPENDIX D (CONTINUED)

TABLE 3
METHOD OF FEEDBACK

	Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
12.	"I would have preferred the receipt of written feedback rather than face-to-face feedback."	Agree	1	2	1	2	6
		Disagree	9	8	9	8	34
		Not App.	10	10	10	10	40
13.	"I would have preferred the receipt of face-to-face feedback rather than written feedback."	Agree	7	7	8	7	29
		Disagree	3	3	2	3	11
		Not App.	10	10	10	10	40
14.	"Face-to-face conferences helped me understand the feedback reports I received."	Agree	9	10	9	10	38
		Disagree	1	-	1	-	2
		Not App.	10	10	10	10	40

APPENDIX D (CONTINUED)

TABLE 4
CHANGES ATTEMPTED IN TEACHING BASED UPON FEEDBACK

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
15. "I attempted no changes since the feedback suggested no changes that I felt would be profitable in terms of pupil achievement and/or improving pupil attitude."	Agree	4	2	3	-	9
	Disagree	16	18	17	-	51
	Not App.	-	-	-	20	20
16. "I attempted to make the objectives of the lesson clearer to my pupils."	Agree	16	-	14	-	30
	Disagree	4	-	6	-	10
	Not App.	-	20	-	20	40
17. "I attempted to make my explanations and instructions clearer."	Agree	15	-	15	-	30
	Disagree	5	-	5	-	10
	Not App.	-	20	-	20	40
18. "I attempted to improve my lesson materials."	Agree	15	-	13	-	28
	Disagree	5	-	7	-	12
	Not App.	-	20	-	20	40
19. "I attempted to provide for the needs, interests and experience level of my pupils."	Agree	17	-	12	-	29
	Disagree	3	-	8	-	11
	Not App.	-	20	-	20	40
20. "I attempted to provide more realistic and challenging instructions."	Agree	15	-	14	-	30
	Disagree	5	-	5	-	10
	Not App.	-	20	-	20	40

APPENDIX D (CONTINUED)

TABLE 4 (CONTINUED)
CHANGES ATTEMPTED IN TEACHING BASED UPON FEEDBACK

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
21. "I attempted to better conclude my lessons."	Agree	14	-	15	-	29
	Disagree	6	-	5	-	11
	Not App.	-	20	-	20	40
22. "I attempted to use a greater variety of teaching methods."	Agree	13	-	13	-	26
	Disagree	7	-	7	-	14
	Not App.	-	20	-	20	40
23. "I attempted to accept the feelings of my pupils more than I previously did."	Agree	-	14	12	-	26
	Disagree	-	6	8	-	14
	Not App.	20	-	-	20	40
24. "I attempted to provide more praise and encouragement of my pupils for their responses and ideas."	Agree	-	14	13	-	27
	Disagree	-	6	7	-	13
	Not App.	-	-	-	-	-
25. "I attempted to accept and use the ideas of my students.	Agree	-	17	14	-	31
	Disagree	-	3	6	-	9
	Not App.	20	-	-	20	40
26. "I attempted to ask a lesser amount of memory-recall questions and a correspondingly larger amount of thought-provoking questions."	Agree	-	15	16	-	31
	Disagree	-	5	4	-	9
	Not App.	20	-	-	20	40
27. "I attempted to lecture less and encourage more active student verbal participation in the topics under discussion."	Agree	-	19	12	-	31
	Disagree	-	1	8	-	9
	Not App.	20	-	-	20	40

APPENDIX D (CONTINUED)

Well over one-third of all teachers agreed that too much was covered in too short a time at the orientation/training meetings and that instruction in interaction analysis was not sufficient for them to accurately interpret the matrices. In spite of this, only four teachers in Treatment 3 indicated that they felt the training was inadequate for them to understand the feedback and they had no meaningful basis for attempting to change their teaching.

Eight teachers reported that there was too much time lapse between the training sessions in interaction analysis and the receipt of feedback. Seven of these teachers were in Treatment 3. These teachers received their first feedback approximately six weeks after the last training session, whereas teachers in Treatment 2 received their reports within four weeks of the last training meeting.

Teachers in Treatment 2 were observed four times in the fall. Only two observations were made of teachers in Treatment 3. More teachers in Treatment 2 than in Treatment 3 felt that an adequate sample of their total verbal teaching behavior was observed to form a basis for making decisions on whether to change their verbal teaching behavior. Although 11 teachers reported that an adequate sample of their verbal teaching behavior was not observed, almost all teachers did indicate that they attempted to change at least one aspect of their verbal behavior. (See Table 5 for teachers' reactions to statements 15 and 23-27.)

Forty percent of the teachers felt that the lesson content of the academic subjects selected for observation restricts the amount of verbal interaction. The subjects and number of teachers who felt that the lesson content of these subjects restricts verbal interaction were: mathematics-14, English-8, science-5, reading-4 and social studies-1.

Of the 17 teachers who agreed that direct teaching is generally more effective than indirect teaching in their teaching situations, 13 were males. (The ratio of male to female teachers in the study was 38 to 42.) In the academic subjects selected for observation, the average grade placement on the achievement pretests of pupils of nine of these teachers was less than 6.0.

STUDENT RATINGS OF TEACHING

The reactions of teachers to statements concerning student ratings of teaching performance are shown in Table 6.

APPENDIX D (CONTINUED)

TABLE 5
INTERACTION ANALYSIS

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
28. "...I received an adequate understanding of the rationale and the purpose of the study."	Agree	15	16	16	18	65
	Disagree	5	4	4	2	15
29. "I received adequate training in interaction analysis to understanding the feedback reports..."	Agree	-	18	13	-	31
	Disagree	-	2	7	-	9
	Not App.	20	-	-	20	40
30. "Too much was covered in too short a time at the orientation/ training meetings."	Agree	10	10	6	5	31
	Disagree	10	10	14	15	49
31. "Instruction was not sufficient for accurate interpretation of the matrices."	Agree	10	11	8	6	35
	Disagree	10	9	12	14	45
32. "There was too much lapse between the training sessions and receipt of feedback."	Agree	-	1	7	-	8
	Disagree	-	19	13	-	32
	Not App.	20	-	-	20	40
33. "Since the training...was inadequate...to understand the feedback..., I had no meaningful basis for attempting to change my teaching."	Agree	-	-	4	-	4
	Disagree	-	20	16	-	36
	Not App.	20	-	-	20	40

APPENDIX D (CONTINUED)

TABLE 5 (CONTINUED)
INTERACTION ANALYSIS

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
34. "An adequate sample of my total verbal teaching behavior was observed in the fall to give me a basis for making decisions on whether to change my verbal teaching behavior."	Agree	-	16	13	-	29
	Disagree	-	4	7	-	11
	Not App.	20	-	-	20	40
35. "The lesson content of the subject selected for observation restricts the amount of teacher-student verbal interaction."	Agree	10	9	7	6	32
	Disagree	10	11	13	14	48
36. "In my teaching situation, I feel that direct teaching is generally more effective than indirect teaching."	Agree	6	3	5	3	17
	Disagree	14	17	15	17	63

APPENDIX D (CONTINUED)

TABLE 6
STUDENT RATINGS OF TEACHING

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
37. "Most of my pupils accurately rated my teaching performance."	Agree	19	-	17	-	36
	Disagree	1	-	3	-	4
	Not App.	-	20	-	20	40
38. "The pupil ratings of my teaching provide a reliable index of my competence as a teacher."	Agree	15	-	15	-	30
	Disagree	5	-	5	-	10
	Not App.	-	20	-	20	40
39. "Sixth-grade pupils are too immature to distinguish good teaching from poor teaching."	Agree	3	2	2	1	8
	Disagree	17	18	18	19	72
40. "Most of the pupil ratings of my teaching were probably influenced by factors such as personality differences, marks, discipline, their attitudes and general scholastic ability."	Agree	10	12	13	10	45
	Disagree	10	8	7	10	35

Although there were only four teachers who reported that most of their pupils did not accurately rate their teaching performance, there were 10 teachers who felt that the ratings do not provide a reliable index of their competence as teachers. Only 10 percent of the teachers felt that sixth-grade pupils are too immature to distinguish good teaching from bad teaching.

Over one-half of the teachers agreed that most of the pupil ratings were probably influenced by factors such as personality differences, marks, etc. In light of this it is somewhat surprising that 36 of the 40 teachers who received feedback on their pupil ratings of their teaching felt that most of their pupils accurately rated their teaching.

PUPIL ACHIEVEMENT TEST SCORES

Statement 41 in Table 7, concerning whether test score information increased the teachers' understanding of their pupils, and statement 6 in Table 1 are very similar. Even so, there are differences in the reactions of the teachers to each statement in all treatments except Treatment 3. Since all teachers received pupil-achievement test score feedback, it cannot be determined why nine teachers responded "Not Applicable" to statement 41. Slightly over one-half of the teachers agreed that knowledge of their pupil test scores was influential in changing their lesson plans and teaching

RECOMMENDATIONS FOR EDUCATION

The responses of teachers to statements concerning recommendations for education appear in Table 8.

Thirty-three of the 40 teachers or 83 percent who received feedback on pupil-teacher ratings reported that the benefits of the ratings in the improvement of teaching are sufficient to suggest their widespread use by upper-intermediate grade teachers. Slightly over 86 percent of all teachers in the study agreed that the benefits of teacher-pupil verbal interaction analysis suggest training in its use in inservice programs.

APPENDIX D (CONTINUED)

TABLE 7
PUPIL ACHIEVEMENT TEST SCORES

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
41. "The test score information increased my understanding of my pupils."	Agree	15	13	13	15	56
	Disagree	5	2	7	1	15
	Not App.	-	5	-	4	9
42. "Knowledge of my pupil test scores was influential in changing my lesson plans and teaching."	Agree	13	9	10	12	44
	Disagree	7	7	10	4	28
	Not App.	-	4	-	4	8

TABLE 8
RECOMMENDATIONS FOR EDUCATION

Statement	Response	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Totals
43. "The benefits of pupil ratings of teaching performance in the improvement of teaching are sufficient to suggest their widespread use by upper-intermediate grade teachers."	Agree	17	-	16	-	33
	Disagree	3	-	4	-	7
	Not App.	-	20	-	20	40
44. "The benefits of teacher-pupil verbal interaction analysis suggest training in its use in in-service programs designed to improve teacher behavior."	Agree	17	17	17	18	69
	Disagree	3	3	3	2	11

APPENDIX E

TABLE 9
PRE-STANFORD CLASS ACHIEVEMENT MEANS

		TREATMENTS									
		1		2		3		4			
Type of Feedback	Classes	Raw Scores	Grade Placement	Raw Scores	Grade Placement	Raw Scores	Grade Placement	Raw Scores	Grade Placement	Means for Total	
	English	86.6	6.22	82.8	5.92	82.2	5.94	92.9	7.03		
	English	92.4	7.06	105.2	8.71	80.5	5.68	79.8	5.52		
	Math	17.5	6.29	16.0	5.85	11.4	4.88	11.4	4.84		
	Math	14.5	5.49	18.5	6.40	22.3	7.28	15.7	5.75		
Face-to-Face	Science	26.3	5.17	30.8	5.85	36.5	7.20	29.7	5.76		
	Science	26.2	5.08	33.5	6.49	27.8	5.31	29.3	5.73		
	S. S.	44.9	6.92	41.3	6.38	46.9	6.94	48.5	7.79		
	S. S.	39.6	6.18	35.1	5.49	53.6	8.49	42.7	6.73		
	Reading	38.4	7.56	28.4	5.89	33.7	6.71	22.2	4.89		
	Reading	34.8	6.87	20.6	5.41	24.5	5.22	33.4	6.61		
Means		42.1	6.28	41.2	6.24	41.9	6.37	40.6	6.07	41.5	6.2
	English	75.6	5.09	84.6	6.12	85.7	6.18	95.4	7.43		
	English	74.5	4.96	81.7	5.84	93.3	7.09	79.9	5.53		
	Math	20.9	7.06	18.0	6.31	19.0	6.45	19.1	6.63		
	Math	22.2	7.26	16.7	6.02	11.8	4.95	15.4	5.73		
Written	Science	30.2	5.63	32.2	6.12	38.7	7.60	30.4	5.93		
	Science	33.0	6.37	30.7	4.69	37.9	7.19	45.8	9.53		
	S. S.	42.2	6.46	38.3	5.96	34.4	5.41	35.6	5.72		
	S. S.	43.3	6.86	44.4	6.79	49.3	7.80	47.7	7.36		
	Reading	21.6	4.82	29.7	6.06	33.7	6.76	15.1	5.22		
	Reading	30.7	6.21	31.5	6.29	36.3	7.18	34.8	5.49		
Means		39.4	6.07	40.8	6.02	44.0	6.66	41.9	6.46	41.5	6.3
Means for Treatments		40.8	6.2	41.0	6.1	43.0	6.5	41.2	6.3	41.5	6.3
										(Grand Means)	

APPENDIX E (CONTINUED)

TABLE 10
POST-STANFORD CLASS ACHIEVEMENT MEANS

		TREATMENTS									
		1		2		3		4			
Type of Feedback	Classes	Raw Scores	Grade Placement	Raw Scores	Grade Placement	Raw Scores	Grade Placement	Raw Scores	Grade Placement	Means for Total	
Face-to-Face	English	92.8	7.10	90.3	6.84	90.5	6.99	97.0	7.73		
	English	100.6	8.30	107.7	9.36	88.0	6.60	91.4	7.00		
	Math	22.8	7.62	19.4	6.62	15.9	5.69	6.5	6.52		
	Math	18.4	6.33	19.4	6.51	27.9	9.22	19.6	6.53		
	Science	30.5	5.96	39.8	7.93	41.7	8.55	34.4	6.61		
	Science	29.6	5.70	37.4	7.54	30.5	5.83	35.5	6.87		
	S. S.	47.4	7.53	48.2	7.55	54.7	8.90	51.9	8.39		
	S. S.	48.6	7.64	43.2	6.51	54.7	9.07	48.2	7.60		
	Reading	45.2	8.65	33.8	6.63	40.1	7.71	27.6	5.65		
	Reading	34.0	7.67	31.1	6.13	30.2	5.95	41.8	7.98		
Means		47.0	7.25	47.0	7.16	47.4	7.45	45.4	7.09	46.7	7.24
Written	English	83.5	5.98	95.6	7.61	97.5	7.89	102.1	8.59		
	English	89.6	6.68	95.6	7.76	98.0	7.95	86.7	6.39		
	Math	28.5	9.20	24.9	8.13	24.9	7.88	25.7	8.43		
	Math	26.2	8.96	23.0	7.48	17.1	5.96	20.5	6.74		
	Science	35.7	6.76	37.6	7.31	43.6	8.93	36.5	7.13		
	Science	38.2	7.52	29.1	5.50	44.6	9.17	48.6	10.44		
	S. S.	47.8	7.45	36.4	5.65	41.6	6.49	42.7	6.75		
	S. S.	47.0	7.44	51.1	8.15	53.3	8.80	54.0	8.99		
	Reading	29.4	5.88	34.2	6.58	40.9	7.74	30.3	6.01		
	Reading	42.7	8.25	36.5	6.94	41.8	8.05	32.2	6.29		
Means		46.9	7.41	46.4	7.11	50.3	7.89	47.9	7.58	47.9	7.50
Means for Treatments		47.0	7.33	46.7	7.14	48.9	7.67	46.7	7.33	47.3	7.37
										(Grand Means)	

APPENDIX E (CONTINUED)

TABLE 11
ANALYSIS OF VARIANCE OF
PRE-STANFORD CLASS ACHIEVEMENT MEANS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	47514.15	-	-
Treatments	3	60.52	20.17	.03
Type Feedback	1	.11	.11	.000
Interaction	3	67.98	22.66	.034
Within (error)	72	47385.54	658.13	-

TABLE 12
ANALYSIS OF VARIANCE OF
POST-STANFORD CLASS ACHIEVEMENT MEANS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	52210.01	-	-
Treatments	3	67.46	22.49	.031
Type Feedback	1	27.50	27.50	.038
Interaction	3	49.17	16.39	.023
Within (error)	72	52065.88	723.14	-

APPENDIX E (CONTINUED)

TABLE 13
MEANS FOR REMMERS SCALE
PRE-TEST

	TREATMENTS				
Feedback	1	2	3	4	Means for Total
Face-to-Face	7.9	7.5	6.3	7.1	
	7.5	7.7	7.2	7.6	
	7.8	7.7	8.1	7.5	
	7.4	7.6	7.3	7.9	
	7.4	8.2	7.9	7.6	
	7.8	7.5	7.7	7.4	
	7.3	7.2	7.8	6.6	
	7.1	7.8	7.2	7.8	
	8.1	8.0	8.2	8.3	
	7.9	7.4	7.8	8.1	
Means	7.6	7.7	7.6	7.6	7.6
Written	7.7	7.7	6.8	8.0	
	7.9	7.9	7.6	6.6	
	8.0	7.8	8.3	7.8	
	7.9	7.8	7.5	7.4	
	7.2	7.8	8.2	7.9	
	7.6	7.8	7.9	7.7	
	8.1	8.0	7.5	7.7	
	7.8	8.0	7.8	7.5	
	7.3	7.5	8.1	7.3	
	8.4	7.2	8.1	7.6	
Means	7.8	7.8	7.8	7.6	7.7
Means for Treatments	7.7	7.7	7.7	7.6	7.7 (Grand Means)

APPENDIX E (CONTINUED)

TABLE 14
MEANS FOR REMMERS SCALE
POST-TEST

	TREATMENTS				
Feedback	1	2	3	4	Means for Total
Face-to-Face	8.0	7.4	7.5	6.9	
	7.6	7.6	7.1	7.7	
	8.2	7.5	8.2	7.7	
	8.0	7.8	8.2	6.9	
	7.7	8.3	7.9	7.9	
	7.3	7.4	7.9	7.9	
	6.9	7.1	8.1	7.3	
	7.7	8.2	7.4	8.0	
	7.9	8.4	8.1	8.4	
	7.6	8.0	7.5	8.3	
Means	7.7	7.8	7.8	7.7	7.7
Written	7.3	7.5	7.5	7.8	
	8.4	7.3	7.0	7.1	
	8.2	7.8	7.9	8.3	
	7.5	8.3	7.6	7.5	
	8.1	7.5	8.1	7.9	
	8.0	7.9	7.5	7.5	
	7.6	7.8	7.9	7.9	
	7.5	7.8	7.5	8.1	
	7.3	7.9	7.9	7.1	
	8.2	7.5	8.0	8.1	
Means	7.8	7.7	7.7	7.7	7.7
Means for Treatments	7.8	7.8	7.7	7.7	7.7 (Grand Means)

APPENDIX E (CONTINUED)

TABLE 15
STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS (PRE-TEST)
ANALYSIS OF VARIANCE

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	12.37	-	-
Treatments	3	.24	.08	.50
Feedback Level	1	.25	.25	1.56
Interaction	3	.21	.07	.44
Within (error)	72	11.67	.16	-

TABLE 16
STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS (POST-TEST)
ANALYSIS OF VARIANCE

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	11.81	-	-
Treatments	3	0.02	0.01	0.06
Feedback Level	1	0.00	0.00	0.00
Interaction	3	0.14	0.05	0.31
Within (error)	72	11.65	0.16	-

APPENDIX E (CONTINUED)

TABLE 17
MEANS FOR STUDENT-TEACHER RATINGS
FIRST CYCLE

	TREATMENTS				
Feedback	1	2	3	4	Means for Total
Face-to-Face	19.26	18.92	19.34	17.76	
	18.14	19.74	18.75	17.59	
	19.00	18.22	17.22	19.57	
	20.73	16.69	19.50	20.00	
	15.68	19.88	20.41	21.65	
	17.78	18.52	19.80	20.34	
	15.43	19.00	20.24	16.19	
	16.50	21.18	17.31	19.77	
	19.15	20.13	20.24	21.41	
	18.93	19.81	19.56	19.77	
Means	18.1	19.2	19.2	19.4	19.0
Written	20.35	18.83	17.43	19.43	
	19.88	19.43	20.38	18.40	
	20.72	10.45	18.92	21.09	
	18.33	20.23	19.90	21.70	
	18.97	17.00	20.89	20.86	
	17.38	19.67	20.91	17.27	
	18.52	19.66	19.73	16.76	
	17.50	18.69	19.90	18.72	
	21.55	20.99	19.00	17.74	
	20.21	15.94	19.93	20.91	
Means	19.3	18.1	19.7	19.3	18.9
Means for Treatments	18.71	18.65	18.97	19.35	19.0 (Grand Means)

APPENDIX E (CONTINUED)

TABLE 18

MEANS FOR STUDENT-TEACHER RATINGS FIFTH CYCLE

	TREATMENTS				
Feedback	1	2	3	4	Means for Total
Face-to-Face	19.34	17.41	17.59	14.96	
	18.93	20.44	15.76	17.65	
	18.93	17.17	18.59	20.19	
	19.33	17.20	21.19	20.38	
	15.17	21.58	22.57	21.36	
	19.42	18.57	20.04	20.65	
	15.43	19.31	21.66	16.18	
	20.04	21.54	16.69	19.75	
	19.96	22.88	20.64	18.29	
	17.41	18.75	19.48	19.30	
Means	18.4	19.5	19.4	18.9	19.0
Written	21.66	17.88	19.61	18.72	
	22.33	20.16	22.30	19.69	
	23.96	19.70	20.69	20.79	
	20.39	22.26	20.55	21.90	
	19.88	15.00	21.18	21.12	
	20.92	19.43	21.24	17.66	
	18.70	22.50	21.62	19.33	
	18.16	18.06	19.34	19.00	
	22.19	21.00	16.20	15.25	
	20.78	14.71	20.32	22.14	
Means	20.8	19.1	20.3	19.6	19.9
Means for Treatments	19.62	19.28	19.86	19.22	19.5 (Grand Means)

APPENDIX E (CONTINUED)

TABLE 19
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 1

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	246.23	-	-
Treatments	3	10.91	3.64	1.191
Type Feedback	1	.32	.32	.105
Interaction	3	15.29	5.10	1.670
Within (error)	72	219.71	3.05	-

TABLE 20
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 5

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	351.56	-	-
Treatments	3	5.67	1.89	.443
Type Feedback	1	16.74	16.74	3.919
Interaction	3	21.68	7.23	1.692
Within (error)	72	307.47	4.27	-

TABLE 21
COEFFICIENTS OF REPRODUCIBILITY
HAYES PUPIL-TEACHER REACTION SCALE

Item	First Rating	Second Rating	Final Rating
1	.83	.81	.82
2	.78	.82	.83
3	.79	.83	.83
4	.78	.86	.87
5	.76	.80	.81
6	.77	.80	.80
7	.78	.84	.84
8	.75	.74	.75
9	.75	.80	.79
Average	.78	.81	.82

TABLE 22
MARGINALS
HAYES PUPIL-TEACHER REACTION SCALE

Item	First Rating	Second Rating	Final Rating
1	.34	.30	.30
2	.74	.79	.77
3	.24	.26	.26
4	.74	.79	.80
5	.38	.44	.40
6	.34	.40	.39
7	.63	.70	.70
8	.29	.34	.36
9	.58	.57	.56
Average	.47	.51	.50

APPENDIX E (CONTINUED)

TABLE 23
INTENSITY ANALYSIS
FOR CYCLES 1, 2, 3, AND 4

HAYES PUPIL-TEACHER REACTION SCALE
CONTENT SCORE

Intensity Score	0	1	2	3	4	5	6	7	8	9	Total	Cum % tile
9	1	0	0	0	0	0	0	1	2	154	158	100
8	1	0	0	0	1	0	1	6	97	76	182	98
7	1	2	1	1	0	3	2	96	128	42	276	95
6	2	34	5	1	4	9	79	210	139	12	495	90
5	4	11	4	7	17	103	269	280	42	0	737	83
4	8	15	26	35	132	334	363	115	0	0	1028	71
3	14	25	61	158	309	399	130	0	0	0	1096	55
2	18	58	188	307	399	137	1	0	0	0	1108	38
1	41	156	272	252	105	0	0	0	0	0	826	21
0	98	196	146	112	0	0	0	0	0	0	552	9
Totals	188	497	703	873	967	985	845	708	408	284	6458	
Cum % tiles	3	11	21	35	50	65	78	89	96	100		
Midpoint of Content % tiles	1.5	7	16.5	28	42.5	57.5	71.5	83.5	92.5	98		
Median of Intensity % tiles	8.6	13.0	18.1	25.0	37.1	53.1	67.9	81.2	90.9	98.2		

APPENDIX E (CONTINUED)

TABLE 24
INTENSITY ANALYSIS
FOR CYCLES 5 AND 6

HAYES PUPIL-TEACHER REACTION SCALE
CONTENT SCORE

Intensity Score	0	1	2	3	4	5	6	7	8	9	Total	Cum % tile
9	9	1	0	0	0	0	1	1	6	94	103	100
8	1	0	0	0	0	0	2	5	79	36	123	96
7	0	1	0	1	0	2	3	58	87	22	174	92
6	1	1	1	1	4	6	38	69	62	3	186	86
5	4	6	3	3	8	48	115	106	22	0	315	80
4	2	9	7	16	40	125	136	35	0	0	370	69
3	6	16	19	52	113	176	60	0	0	0	442	56
2	13	24	79	124	170	65	0	0	0	0	475	41
1	20	88	113	127	67	0	0	0	0	0	415	25
0	62	91	88	74	0	0	0	0	0	3	318	11
Totals	109	237	310	398	402	422	355	274	256	158	2921	
Cum % tiles	4	12	22	36	50	64	76	86	95	100		
Midpoint of Content % tiles	2	8	17	29	43	57	70	81	90.5	97.5		
Median of Intensity % tiles	9.67	15.4	19.3	24.8	37.6	53.4	67.2	79.6	89.0	96.8		

APPENDIX E (CONTINUED)

TABLE 25
LARGE I/D MEANS DETERMINED FROM INTERACTION MATRICES

	TREATMENTS								Means for Totals	
	1		2		3		4			
Type of Feedback	Cycle 1	Cycle 5	Cycle 1	Cycle 5	Cycle 1	Cycle 5	Cycle 1	Cycle 5	Cycle 1	Cycle 5
Face-to-Face	1.28	2.15	2.28	1.23	2.73	3.91	3.68	2.38		
	5.20	61.40	5.78	6.60	1.83	5.20	3.26	15.23		
	3.05	1.19	8.41	5.29	4.99	3.58	1.12	.47		
	3.52	5.25	2.10	1.38	4.54	2.04	5.12	1.85		
	2.13	1.78	2.74	2.44	28.13	2.32	.90	1.46		
	.98	2.91	1.81	2.14	2.10	.80	3.21	2.42		
	3.08	2.16	1.20	1.26	4.26	6.60	6.25	11.33		
	19.14	9.52	4.02	16.54	6.26	5.85	3.23	2.85		
	.99	1.22	5.29	2.05	1.47	.73	2.49	2.60		
	3.48	2.28	1.32	1.24	1.89	3.50	11.54	35.67		
Means	4.29	8.98	3.50	4.02	5.82	3.45	4.08	7.63	4.42	6.01
Written	4.56	2.37	2.47	2.17	8.28	18.08	.98	1.63		
	2.62	2.77	3.10	2.08	3.78	1.29	3.20	1.61		
	1.86	1.27	1.70	3.24	1.02	1.30	1.54	1.67		
	3.96	3.50	1.91	5.19	1.77	1.23	4.22	5.49		
	4.60	4.65	3.02	6.07	2.10	1.07	2.21	2.21		
	2.77	4.05	2.20	.69	1.81	4.05	2.13	1.56		
	.50	1.84	1.37	15.93	2.64	1.70	2.34	4.09		
	6.34	4.67	2.77	1.63	2.02	2.21	2.51	1.02		
	10.07	5.44	5.17	2.93	1.80	1.31	2.18	2.51		
	2.56	2.37	1.52	1.79	4.35	5.89	3.68	12.07		
Means	3.98	3.29	2.52	4.17	2.96	3.81	2.50	3.39	2.99	3.47
Means for Treatments	4.13	6.14	3.01	4.09	4.39	3.63	3.29	5.51	3.71	4.88
									(Grand Means)	

APPENDIX E (CONTINUED)

TABLE 26
SMALL i/d MEANS DETERMINED FROM INTERACTION MATRICES

	TREATMENTS								Means for Totals	
	1		2		3		4			
Type of Feedback	Cycle 1	Cycle 5	Cycle 1	Cycle 5	Cycle 1	Cycle 5	Cycle 1	Cycle 5	Cycle 1	Cycle 5
Face-to-Face	5.54	18.50	4.23	2.88	7.25	9.62	41.00	4.40		
	26.00	60.00	27.25	25.00	17.83	10.44	6.60	24.00		
	6.38	4.55	19.00	96.67	18.80	19.00	4.00	.07		
	5.60	16.25	18.80	22.25	29.00	4.62	22.50	1.88		
	3.94	12.33	76.00	31.67	44.00	2.78	6.20	7.00		
	11.20	25.00	11.38	26.67	9.67	1.02	28.67	7.00		
	47.40	44.00	45.50	61.00	100.00	20.83	142.22	40.00		
	14.60	6.20	12.14	51.00	140.00	76.67	26.67	67.78		
	5.10	7.33	6.23	7.70	2.29	6.67	7.11	1.07		
	35.00	19.50	16.75	4.31	4.75	4.37	32.00	55.00		
Means	16.08	21.37	23.73	32.92	37.36	15.60	31.70	20.82	27.22	22.43
Written	4.56	8.80	9.40	4.20	26.40	8.08	8.12	13.80		
	3.75	2.44	7.45	8.54	12.20	18.75	20.50	7.20		
	3.94	3.33	4.28	5.75	7.33	4.36	3.40	1.85		
	5.59	8.80	3.00	11.71	2.89	4.00	2.35	17.83		
	29.33	13.17	100.00	9.00	37.33	15.75	10.75	16.00		
	14.88	21.67	4.75	8.20	9.11	16.50	44.50	9.57		
	34.00	62.00	7.70	17.40	24.60	67.00	11.17	18.75		
	4.19	7.82	24.75	88.00	30.00	28.00	20.67	3.47		
	20.50	10.00	9.23	5.94	22.00	9.00	5.92	1.56		
	20.33	10.86	8.90	11.43	75.56	21.00	67.00	39.00		
Means	14.11	13.80	17.95	17.02	24.74	19.24	19.44	12.90	19.06	15.74
Means for Treatments	15.09	17.58	20.84	24.97	31.05	17.42	25.57	16.86	23.14 (Grand Means)	19.21

APPENDIX E (CONTINUED)

TABLE 27
ANALYSIS OF VARIANCE LARGE I/D
CYCLE 1

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	1182.59	-	-
Treatments	3	26.18	8.73	.572
Type Feedback	1	40.86	40.86	2.68
Interaction	3	17.80	5.93	.389
Within (error)	72	1097.75	15.25	-

TABLE 28
ANALYSIS OF VARIANCE LARGE I/D
CYCLE 5

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	5314.36	-	-
Treatments	3	82.87	27.62	.399
Type Feedback	1	110.80	110.80	1.602
Interaction	3	141.79	47.26	.683
Within (error)	72	4978.89	69.15	-

APPENDIX E (CONTINUED)

TABLE 29
ANALYSIS OF VARIANCE REVISED i/d
CYCLE 1

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	62024.02	-	-
Treatments	3	2771.02	923.67	1.156
Type Feedback	1	1330.65	1330.65	1.665
Interaction	3	403.25	134.42	.168
Within (error)	72	57519.10	798.88	-

TABLE 30
ANALYSIS OF VARIANCE REVISED i/d
CYCLE 5

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	36375.91	-	-
Treatments	3	889.78	296.59	.636
Type Feedback	1	961.54	961.54	2.063
Interaction	3	967.83	322.61	.692
Within (error)	72	33556.77	466.07	-

APPENDIX E (CONTINUED)

TABLE 31
INTERACTION ANALYSIS RESULTS
CYCLES 1, 2, 3 AND 4

Categories	Range of Scores		Percentage of Time
	Highest	Lowest	Average Score
1. Accepting student feeling	2.27	0	.15
2. Praising students	9.77	0	3.10
3. Accepting or using student ideas	26.54	1.22	15.22
4. Asking questions for students to answer	41.49	5.17	23.19
5. Lecturing	48.68	.81	15.40
6. Giving directions	7.31	0	1.44
7. Criticizing students or justifying teacher authority	3.22	0	.55
8. Talk by students in response to teacher	60.88	4.60	20.71
9. Talk initiated by students	60.59	0	16.92
10. Periods of silence or confusion	26.72	.21	3.22

APPENDIX E (CONTINUED)

TABLE 32
MEANS FOR MTAI[1]
PRE-TEST

Feedback	TREATMENTS				Means for Total
	1	2	3	4	
Face-to-Face	32	44	82	90	
	76	108	84	95	
	21	72	79	83	
	61	64	65	120	
	81	87	95	105	
	64	50	63	85	
	134	83	76	110	
	100	57	70	109	
	58	0	56	87	
	114	76	46	39	
Means	74.1	64.1	71.6	92.3	75.5
Written	44	70	72	82	
	52	76	58	56	
	70	41	52	73	
	110	51	52	109	
	54	66	56	62	
	100	87	94	80	
	51	38	82	53	
	42	33	65	67	
	103	89	89	104	
	30	73	62	81	
Means	65.6	62.4	68.2	76.7	68.2
Means for Treatments	69.9	63.3	69.9	84.5	71.9 (Grand Means)

[1] To eliminate negative MTAI means, a constant of 27 was added to each score.

APPENDIX E (CONTINUED)

TABLE 33
MEANS FOR MTAI[1]
POST-TEST

	TREATMENTS				
Feedback	1	2	3	4	Means for Total
Face-to-Face	23	22	91	70	
	107	125	85	95	
	4	97	82	98	
	50	34	75	154	
	62	126	139	92	
	85	16	107	64	
	144	82	84	109	
	89	79	114	116	
	64	0	68	90	
	142	85	31	88	
Means	77.0	66.6	87.6	97.6	82.2
Written	19	74	56	94	
	119	61	65	46	
	84	35	78	71	
	133	71	55	137	
	43	64	32	77	
	115	108	71	91	
	69	35	101	90	
	95	59	47	96	
	78	113	100	117	
	52	89	74	93	
Means	80.7	70.9	67.9	91.2	77.7
Means for Treatments	78.9	68.8	77.8	94.4	79.9 (Grand Means)

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[1] To eliminate negative MTAI means, a constant of 33 was added to each score.

APPENDIX E (CONTINUED)

TABLE 34
ANALYSIS OF VARIANCE MTAI (PRE-TEST)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	48146.75	-	-
Treatments	3	4835.65	1611.88	2.79*
Feedback Level	1	1065.80	1065.80	1.84
Interaction	3	584.50	194.83	.34
Within (error)	72	41660.80	578.62	-

* 2.74 needed at .05 level to be significant

TABLE 35
ANALYSIS OF VARIANCE MTAI (POST-TEST)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	88104.69	-	-
Treatments	3	6805.84	2268.61	2.07
Feedback Level	1	409.52	409.52	.37
Interaction	3	1896.63	632.21	.58
Within (error)	72	78992.70	1097.12	-

APPENDIX E (CONTINUED)

TABLE 36
MEANS FOR MTAI
ANALYSIS OF COVARIANCE

Source of Variation	df	x^2	xy	y^2
Total	78	48146.75	50660.37	88104.69
Treatments	3	4835.65	5712.07	6805.84
Within (error)	75	43311.10	44948.30	81298.85

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	78	34799.47	446.15	-
Treatments	3	148.01	49.34	.11
Within (error)	75	34651.46	462.02	1.04

APPENDIX E (CONTINUED)

TABLE 37
COEFFICIENTS OF CONSISTENCY
HAYES PUPIL-TEACHER REACTION SCALE

TREATMENT 1

Cycles	r	Number of Weeks Between Ratings
1 & 2	.77	3
1 & 3	.75	6
1 & 4	.69	9
1 & 5	.74	21
1 & 6	.70	25
2 & 3	.81	3
2 & 4	.85	6
3 & 4	.85	3
5 & 6	.79	3

TREATMENTS 1, 2, 3, AND 4

Cycles	r	Number of Weeks Between Ratings
1 & 2	.73	3
1 & 5	.58	21

APPENDIX E (CONTINUED)

TABLE 38
COEFFICIENTS OF CORRELATIONS USING CLASS MEANS

Variables	Pre	Post
Teacher Attitude (MTAI) and Student Attitude Toward School Subjects	-.29	-.13
Student Ratings of Teachers and Student Attitude Toward School Subjects	.37**	.45**
Student Achievement and Student Attitude Toward School Subjects	-.27*	-.33**
Student Achievement and Teacher Attitude (MTAI)	-.16	-.004
Principal's Ratings of Teachers and Teacher Attitude (MTAI)	.01	.59**
Student Ratings of Teachers and Principal's Ratings of Teachers		.27*
Pre- and Post-Test Stanford Achievement Scores		.99**

** Significant at the .01 level.
 * Significant at the .05 level.
N=80 for all of the above correlations.

TABLE 39
ANALYSIS OF VARIANCE OF PRE-STANFORD STUDENT ACHIEVEMENT SCORES

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1911	1079428.80	-	-
Treatments	3	3745.40	1248.47	2.216
Type Feedback	1	3.00	3.00	.005
Interaction	3	2765.10	921.70	1.636
Within (Error)	1904	1072915.30	563.51	-

TABLE 40
ANALYSIS OF VARIANCE OF POST-STANFORD STUDENT ACHIEVEMENT SCORES

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1911	1174742.80	-	-
Treatments	3	4360.80	1453.60	2.369
Type Feedback	1	1920.20	1920.20	3.130
Interaction	3	297.60	99.20	0.162
Within (Error)	1904	1168164.20	613.53	-

APPENDIX E (CONTINUED)

TABLE 41
STANFORD STUDENT ACHIEVEMENT SCORES
ANALYSIS OF COVARIANCE

Source of Variation	df	x^2	xy	y^2
Total	1910	1079428.50	1035850.00	1174742.30
Treatments	3	3745.30	3719.90	4360.50
Type of Feedback	1	2.80	73.30	1919.80
Interaction	3	2765.20	821.40	297.80
Within (error)	1903	1072915.20	1031235.40	1168164.20

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1910	180710.83	-	-
Treatments	3	669.67	223.22	2.400
Type of Feedback	1	1781.48	1781.48	19.155**
Interaction	3	1270.22	423.41	4.552**
Within (error)	1903	176989.46	93.01	-

** Significant at .01 level

ADJUSTED STUDENT ACHIEVEMENT MEANS

Treatment 1	64.88
Treatment 2	63.29
Treatment 3	63.62
Treatment 4	63.95
Face-to-Face Feedback	62.97
Written Feedback	64.90
Face-to-Face Feedback, Treatment 1	62.93
Written Feedback, Treatment 1	66.83
Face-to-Face Feedback, Treatment 2	61.77
Written Feedback, Treatment 2	64.82
Face-to-Face Feedback, Treatment 3	63.11
Written Feedback, Treatment 3	64.14
Face-to-Face Feedback, Treatment 4	64.08
Written Feedback, Treatment 4	63.83

APPENDIX E (CONTINUED)

TABLE 42
ANALYSIS OF VARIANCE OF STUDENT ATTITUDES TOWARD SCHOOL SUBJECTS (PRE-TEST)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1911	227537.00	-	-
Treatments	3	1304.00	434.67	3.669*
Type Feedback	1	239.00	239.00	2.018
Interaction	3	451.00	150.33	1.269
Within (error)	1904	225543.00	118.46	-

*Significant at .05 level

TABLE 43
ANALYSIS OF VARIANCE OF STUDENT ATTITUDES TOWARD SCHOOL SUBJECTS (POST-TEST)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1911	217700.00	-	-
Treatments	3	121.00	40.33	.354
Type Feedback	1	3.00	3.00	.026
Interaction	3	509.00	169.67	1.488
Within (error)	1904	217067.00	114.01	-

APPENDIX E (CONTINUED)

TABLE 44

STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS ANALYSIS OF COVARIANCE

Source of Variation	df	x^2	xy	y^2
Total	1910	227537.00	80102.00	217699.00
Treatments	3	1303.00	188.00	120.00
Type of Feedback	1	239.00	24.00	2.00
Interaction	3	453.00	234.00	509.00
Within (error)	1903	225542.00	79656.00	217068.00

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1910	189499.86	-	-
Treatments	3	149.41	49.80	0.502
Type of Feedback	1	14.84	14.84	0.149
Interaction	3	400.19	133.40	1.344
Within (error)	1903	188935.42	99.28	-

APPENDIX E (CONTINUED)

TABLE 45
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 1

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1911	7693.93	-	-
Treatments	3	13.05	4.35	1.084
Type Feedback	1	12.08	12.08	3.012
Interaction	3	29.52	9.84	2.452
Within (error)	1904	7639.27	4.01	-

TABLE 46
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 5

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1911	10320.61	-	-
Treatments	3	28.95	9.65	1.823
Type Feedback	1	109.71	109.71	20.725**
Interaction	3	102.78	34.26	6.472**
Within (error)	1904	10079.17	5.29	-

** Significant at .01 level

APPENDIX E (CONTINUED)

TABLE 47
ANALYSIS OF COVARIANCE FOR HAYES REACTION SCALE

Source of Variation	df	x^2	xy	y^2
Total	1910	7693.93	4045.16	10320.61
Treatments	3	13.05	-5.16	28.94
Type Feedback	1	12.08	36.41	109.71
Interaction	3	29.52	45.68	102.79
Within (error)	1903	7639.27	3968.24	10079.17

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	1910	8193.87	-	-
Treatments	3	37.81	12.60	2.991*
Type of Feedback	1	75.02	75.02	17.807**
Interaction	3	63.18	21.06	4.998**
Within (error)	1903	8017.86	4.21	-

* Significant at .05 level
** Significant at .01 level

ADJUSTED STUDENT ACHIEVEMENT MEANS

Treatment 1	4.70
Treatment 2	4.46
Treatment 3	4.71
Treatment 4	4.40
Face-to-Face Feedback	4.37
Written Feedback	4.77
Face-to-Face Feedback, Treatment 1	4.25
Written Feedback, Treatment 1	5.16
Face-to-Face Feedback, Treatment 2	4.52
Written Feedback, Treatment 2	4.40
Face-to-Face Feedback, Treatment 3	4.54
Written Feedback, Treatment 3	4.89
Face-to-Face Feedback, Treatment 4	4.18
Written Feedback, Treatment 4	4.62

APPENDIX E. (CONTINUED)

TABLE 48
CORRELATION MATRIX USING PUPIL SCORES

	1	2	3	4	5	6
1. Stanford Raw Score (Fall)						
2. Hayes (Fall, #1)	-0.06					
3. Hayes (Fall, #2)	-0.05	0.59				
4. Remmers (Fall)	0.04	0.10	0.13			
5. Stanford Raw Score (Spring)	0.92	-0.04	-0.03	0.06		
6. Hayes (Spring, Cycle 5)	-0.03	0.45	0.56	0.13	0.02	
7. Remmers (Spring)	-0.00	0.08	0.12	0.36	0.01	0.18